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PROCEEDINGS

OF THE

LITERARY AND PHILOSOPHICAL SOCIETY

OF

LIVERPOOL,

DURING THE

SIXTY-FIFTH SESSION, 1875-76.

No. XXX.

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The Authors have revised their Papers.

The Authors alone are responsible for facts and opinions.

The Society exchanges Proceedings with other publishing bodies, through the Librarian, from whom back numbers may be obtained.

CONTENTS.

PAGE

COUNCIL vii

LIST OF MEMBERS viii

HONORARY MEMBERS xix

CORRESPONDING MEMBERS xxi

ASSOCIATES xxii

DONATIONS TO THE LIBRARY xxiii

LIST OF SOCIETIES, ETC., TO WHICH THIS VOLUME IS PRESENTED xxxix

BALANCE SHEET xliii

ANNUAL MEETING—REPORT xlv

ELECTION OF COUNCIL.

RE-ELECTION OF ASSOCIATES.

PRESIDENT'S INAUGURAL ADDRESS ON THE TENDENCIES AND THE FUTURE OF MODERN CIVILISATION.

FIRST ORDINARY MEETING xlix

Notes and Communications on the following objects exhibited :—

Luffaria Archeri, Halichondria birotulata, and other Sponges, by Mr. THOS. HIGGIN.

An Orthoceras from the Millstone Grit of Sweeney Mountain, near Oswestry, by Mr. G. H. MORTON, F.G.S.

A Collection of Shells of the Genus Oliva, by Mr. F. P. MARRAT.

Tusk of the Siberian Mammoth ; Egg-sacs and Spawn of various Molluscs ; Skulls and Bones of Pouched

425883

PAGE

Rats; Specimens of rare fish, allied to Spinola's Deal Fish, and of Balani and Mangrove Oysters; Sample of the Fossil Fish, *Dapedius punctatus*; all by Mr. T. J. Moore, Cor. Mem. Z.S.

Our Social Wasps, and on a Specimen of Polistes taken at Ince Blundell, by the Rev. H. H. Higgins, M.A.

Second Ordinary Meeting lxvi

Magneto-electric Machine, exhibited by Dr. Campbell-Brown.

Specimen of Eucalyptus, exhibited by Dr. Carter.

Notice of a Poem, by Mr. Brooke, on "Liverpool," published in 1820, by Mr. J. A. Picton, F.S.A.

Dr. Campbell-Brown on "Electricity compared with Heat, as a source of Motive Power."

Third Ordinary Meeting lxx

Fossil Corals, from the Carboniferous Limestone of North Wales, by Mr. G. H. Morton, F.G.S.

Skeleton of the Dinornis Elephantopus, by Mr. T. J. Moore, Cor. Mem. Z.S.

Fourth Ordinary Meeting lxxi

Mr. E. R. Russell on "The True Macbeth."

Fifth Ordinary Meeting lxxii

Mr. James A. Picton, F.S.A., on "The House of Stanley, and the Origin of its Legend of the Eagle and Child."

Dr. Inman "On a means employed for Removing and Erecting Menhirs."

Sixth Ordinary Meeting lxxii

Mr. Alfred Morgan, "A few Notes on the Khāsi Hill Tribes, and the Geology of the Shillong Plateau."

Mr. Joseph Boult, "Gleanings from the Early History of Liverpool."

PAGE

SEVENTH ORDINARY MEETING lxxiii

Note on the Radiometer, exhibited by Mr. R. C. JOHNSON, F.R.A.S.

Skeletons of two species of the Apteryx, &c., exhibited by Mr. T. J. MOORE, Cor. Mem. Z.S.

Oxy-Hydrogen Exhibition of the Gems of Ancient and Modern Statuary, by Dr. RICKARD.

EIGHTH ORDINARY MEETING lxxv

Mr. J. NEWBY HETHERINGTON, on "Repetition and Reduplication in Language."

NINTH ORDINARY MEETING lxxvi

Facsimile of the Ardagh Chalice, exhibited by Mr. J. A. PICTON, F.S.A.

Note on the Relation of Flowers to Insects, by Mr. A. MORGAN.

Mr. THOMAS WARD, on "Salt, and its Export from the Ports of the Mersey."

TENTH ORDINARY MEETING..... lxxix

Mr. J. LINTON PALMER, on "Some Tablets found in Easter Island."

Mr. ALFRED LUTSCHAUNIG, on "Method in Creation."

ELEVENTH ORDINARY MEETING lxxix

Rev. T. P. KIRKMAN, on "The Janal 14-Acral 14-Edra."

Mr. BARON LOUIS BENAS, on "The Men who have influenced Modern German Thought."

TWELFTH ORDINARY MEETING..... lxxx

Mr. W. T. BLACK, on "The Partridges of South Africa, and Partridge Shooting in the Great Winterberg District."

Dr. NICHOLSON, on "Indian Snakes."

Specimens of Luffaria, exhibited by Capt. J. A. PERRY.

PAGE

Note on the Trinotion and other Parasites which infest the Pelican, by Capt. J. A. Perry.

Thirteenth Ordinary Meeting lxxxi

Mr. A. E. Nevins, on "A Method of Correcting the Rate of a Marine Chronometer for Changes of Temperature."

Specimens of Variegated Marble, from Numidia, exhibited by Mr. J. A. Picton, F.S.A.

Specimen of Flexible Sandstone, exhibited by Mr. A. Morgan.

Notes on objects exhibited by Mr. T. J. Moore, Cor. Mem. Z.S.:—Specimens of the Himalayan Ibex; of the Warryato or Neilgherry Ibex; Head and Horns of the Chiru, or Hodgson's Antelope; Head and Horns of the Oorial and the Burrhel; a large Flying Squirrel, from Kashmir, a Thibet Marmot; Skulls, &c., of Voles, the Musk Shrew, the Susu, &c.; a rare Siluroid Fish, genus Plecostomus, from Uruguay; Curiosities from Western Africa; also, a Note on a Cetacean (Orca Gladiator), stranded on the Cheshire Coast.

Mr. Richmond Leigh, on "Vegetation and Climate."

PAPERS PRINTED.

PAGE

Mr. James A. Picton, F.S.A.—President's Address—"The Tendencies and the Future of Modern Civilisation" ... 1

Mr. Edward R. Russell.—"The True Macbeth" 41

Mr. J. Campbell-Brown, D.Sc., etc.—"On Electricity compared with Heat as a source of Mechanical Power" 93

Mr. Thomas Inman, M.D.—"On a means employed for removing and erecting Menhirs"..... 108

PAGE

Mr. Alfred Morgan.—"On the Khāsi Hill Tribes of North-eastern Bengal, and on the Geology of the Shillong Plateau" 115

Mr. J. Newby Hetherington.—"On Repetition and Reduplication in Language" 129

Mr. Joseph Boult, F.R.I.B.A.—"Gleanings in the Early History of Liverpool and the Neighbourhood" 153

Mr. Thomas Ward.—"Salt, and its Export from the Ports of the Mersey" 183

Mr. Edward Nicholson, F.C.S.—"On Indian Snakes" ... 211

Mr. Alfred Morgan.—"A Note on Itacolumyte, or Flexible Sandstone" 223

Mr. Arthur Edward Nevins.—"On the Method of correcting the rate of a Marine Chronometer for changes of Temperature, according to Mr. Hartnup's Laws, with Tables and explanations for facilitating the computation of the same corrections" 227

Mr. Baron Louis Benas.—"On the Men who have influenced Modern German Thought" 235

Mr. J. Linton Palmer, F.S.A., F.R.G.S., R.N.—"On some Tablets found in Easter Island" 255

Mr. James A. Picton, F.S.A.—"The House of Stanley and the Legend of the Eagle and Child" 265

Rev. Thomas P. Kirkman, M.A., F.R.S.—"The Janal 14-Acral 14-Edra" 271

Mr. Richmond Leigh, M.R.C.S.E.—"Vegetation and Climate" 279

Mr. W. T. Black, Surgeon-Major.—"Natural History of the Greywing and Redwing Partridges of South Africa" 297

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ORDINARY MEMBERS,

ON THE SOCIETY'S ROLL AT THE CLOSE OF THE 65TH SESSION,

CORRECTED TO JUNE, 1876.

Life Members are marked with an Asterisk.

Oct. 21, 1872 Abbott, Joseph, B.A., 10, *Sandown-terrace*, *Wavertree-road*, and *Liverpool College*, *Shaw-street*, *Everton*.

Oct. 11, 1838 Aikin, James, 4, *Gambier-terrace*.

Nov. 4, 1867 Allen, John Fenwick, *Peaseley Vale*, *St. Helens*.

March 7, 1864 Archer, F., B.A. Trin. Col. Cantab., *Boundary Cottage*, *Little Crosby*.

*Nov. 28, 1853 Archer, T. C., F.R.S.E., F.R.S.S.A., Director of the Industrial Museum, *Edinburgh*.

Dec. 14, 1868 Ashe, Theop. Fielding, 9–15, *Atherton-street*.

Feb. 22, 1855 Avison, Thomas, F.S.A., 18, *Cook-street*, and *Fullwood Park*, *Aigburth*.

Jan. 11, 1864 Bagshaw, John, 87, *Church-street*, and 26, *Bentley-road*, *Prince's Park*.

May 4, 1868 Bailey, Fras. J., M.R.C.S., 51, *Grove-street*.

March 28, 1874 Barclay, W., 5, *Scottish Chambers*, 48, *Castle-street*, and 6, *Montpelier-crescent*, *New Brighton*.

Dec. 13, 1875 Barnes, James, *Litherland Park*.

April 20, 1874 Barton, Rev. John, M.A., *Vicarage*, *Rainhill*.

Nov. 15, 1869 Beer, Joseph B. de, *Northern Assurance Chambers*, *Tithebarn-street*.

March 9, 1857 Bell, Christopher, *Redcross-street*, and 55, *Hamilton-square*, *Birkenhead*.

Jan. 11, 1875 Bell, Wilson, 1, *Laburnum Villas*, *Egerton-street*, *New Brighton*.

Feb. 22, 1875 Bellew, Thomas A., *Cunard Mail Office*, 8, *Water-street.*

Nov. 15, 1875 Bellis, William, 3, *Sandown-terrace, Wavertree.*

Dec. 10, 1866 Benas, Baron Louis, 5, *South Castle-street.*

Nov. 27, 1865 Biggs, Arthur Worthington, 28, *Exchange Street East*, and 11, *Percy-street.*

Feb. 6, 1872 Biggs, John H. W., 6, *Windsor-buildings, George-street.*

Oct. 31, 1859 Birch, Jas. (Messrs. Reiss Brothers), *The Temple, Dale-street.*

Jan. 25, 1864 Birchall, James, Governor of the Liverpool Industrial Schools, *Kirkdale*, HON. SECRETARY.

Dec. 14, 1874 Black, Rev. R., M.A., 26, *Falkner-street.*

March 9, 1866 Blood, William, *Chamber of Commerce*, and *Greta Mount*, 5, *Woodchurch-road, Birkenhead.*

Nov. 26, 1866 Boult, Joseph, 15D, *Exchange-buildings, W.*

Oct. 19, 1868 Bower, Anthony, *Vauxhall Foundry*, and *Bowersdale, Seaforth.*

Oct. 21, 1872 Bowring, C. T., *Elmsleigh, Prince's Park*, and 20, *Lancaster-buildings, Tithebarn-street.*

Dec. 15, 1873 Brass, Joseph, M.D., 6, *Upper Parliament-street.*

Nov. 4, 1867 Bramwell, Ed., *Cowley Hill, St. Helens.*

Jan. 27, 1873 Bremner, H. H., 15, *Lord-street.*

Nov. 12, 1866 Browne, Edgar A., 86, *Bedford-street South.*

Oct. 18, 1869 Brown, J. Campbell, D.Sc., F.C.S., *School of Medicine, Dover-street.*

Feb. 4, 1867 Burden, Edward, 123, *Upper Parliament-street.*

Nov. 12, 1866 Butler, Rev. George, *The College, Shaw-street.*

April 18, 1864 Burne, Joseph, *Royal Insurance Office*, 1, *North John-street*, and *Higher Tranmere.*

*May 1, 1848 Byerley, Isaac, F.L.S., F.R.C.S., *Victoria-road, Seacombe.*

Nov. 3, 1862 Cameron, John, M.D., M.R.C.P., Physician to the Southern Hospital, and Lecturer on Medicine at the Royal Infirmary School of Medicine, 17, *Rodney-street.*

Dec. 2, 1872 Carey, Eustace, *Appleton-in-Widnes, near Warrington.*

Jan. 9, 1865 Cariss, Astrup, 40, *Castle-street.*

Mar. 4, 1872 Carter, W., M.B. Lond., 74, *Rodney-street.*

Dec. 2, 1861 Chadburn, William, 71, *Lord-street.*

April 3, 1876 Chantrell, G. F., 1, *St. James's Mount.*

Feb. 22, 1875 Chapman, Thomas, *Oaklynne, Parkfield-road, Prince's Park.*

Oct. 18, 1869 Cook, Henry James, *Byrom-street,* and *Burbo House, Blundell Sands.*

Dec. 13, 1875 Cowell, Peter, *Free Library, William Brown-street.*

Oct. 6, 1863 Crosfield, William, Jun., 28, *Temple Court,* and *Alexandra-drive, Ullet-road.*

Dec. 14, 1868 Daly, Dennis, 11, *Rumford-street.*

Nov. 12, 1866 Davies, E., F.C.S., *The Laboratory, Royal Institution, Colquitt-street.*

Nov. 2, 1863 Dawbarn, William, *The Temple, Dale-street,* and *Mossley-hill.*

Oct. 20, 1873 Day, George, 23, *Brunswick-street,* and *Abbey Cottage, Aintree.*

Oct. 1, 1866 Dawson, Thomas, 26, *Rodney-street.*

April 6, 1874 Dodd, John, 6, *Thomas-street,* and 2, *Derby-terrace, Rock Ferry.*

Nov. 27, 1863 Dove, John M., *Claughton.*

Nov. 1, 1875 Doyle, Jas. F., 4, *Harrington-street,* and *Merton-road, Bootle.*

Jan. 23, 1848 Drysdale, John James, M.D. Edin., M.R.C.S. Edin., 36, *Rodney-street.*

Feb. 4, 1856 Duckworth, Henry, F.L.S., F.R.G.S., F.G.S., 32, *Brown's-buildings, Exchange-street, W.*

Nov. 1, 1875 Edmunds, William, *Edmond-street Chambers, Edmond-street.*

*Nov. 27, 1848 Edwards, J. B., Ph.D.Gies, F.C.S., Professor Medical Faculty of Bishop's College, *Montreal.*

Mar. 21, 1870 Edwards, Edward E. (Smith, Edwards & Co.), *Adelaide-buildings,* 4, *Chapel-street.*

Feb. 24, 1868 Elliot, John, 35, *Peter's-lane.*

April 7, 1862 English, Charles J., 26, *Chapel-street*, and 26, *Falkner-square.*

April 20, 1874 English, Robert A., 26, *Falkner-square.*

*Dec. 13, 1852 Ferguson, William, F.L.S., F.G.S., *Kinmundy House, near Mintlaw, N.B.*

Feb. 9, 1863 Finlay, Wm., Senior Mathematical Master, Middle School, *Liverpool College*, and 310, *Shaw-street.*

Oct. 1, 1866 Fletcher, Alfred E., F.C.S., H.M. Inspector of Alkali Works for the Western District, 21, *Overton-street, Edge-hill.*

Nov. 15, 1875 Fleming, E. L., F.C.S., *Borax Works, Old Swan.*

*Mar. 19, 1855 Ford, James Thomas, 5, *Essex-ct., Temple, E.C.*

Dec. 2, 1872 Forwood, Wm. Bower (Messrs. Leech, Harrison & Forwood), 16, *Queen-buildings*, 11, *Dale-street* and *Burbo Bank-road, Blundell Sands.*

Nov. 16, 1874 Fothergill, Charles George, *Gambier-terrace.*

Jan. 12, 1874 Frost, John Pownall, 10, *North John-street.*

Nov. 29, 1875 Gardner, William, *Ash Lea, Oak-hill Park.*

*Feb. 6, 1854 Gee, Robert, M.D.Heidelb., M.R.C.P., Lecturer on Diseases of Children, Royal Infirmary School of Medicine; Physician, Workhouse Hospital, 5, *Abercromby-square.*

Nov. 3, 1873 Geldart, Rev. E. M., M.A., 8, *Wellfield-place, Peel-street.*

Dec. 14, 1874 Greaves, Leycester H., *Apsley Villa, Wellington-road, Wavertree.*

Nov. 14, 1853 Greenwood, Henry, 32, *Castle-street*, and *Stanley Park.*

Nov. 16, 1874 Grindley, Benjamin H., 23, *Seel-street.*

Dec. 15, 1873 Grisewood, William, *Queen-street, Liscard.*

Dec. 14, 1874 Gunn, Rev. W. E. B., M.A., 3, *Blackburne-terrace, Blackburne-place.*

Nov. 16, 1874 Guthrie, Malcolm, 31, *Stanley-road, Bootle.*

Jan. 22, 1855 Hakes, James, M.R.C.S., Surgeon to the Northern Hospital, 30, *Hope-street.*

Oct. 18, 1875 Hale, Philip A., Bank of England, *Castle-street.*

Oct. 21, 1872 Halliwell, Joseph, 10, *College-lane.*

*Jan. 21, 1856 Hardman, Lawrence, 35, *Rock Park, Rock Ferry.*

Dec. 18, 1875 Harpin, E., 46, *Onslow-road, Elm Park, Fairfield.*

Nov. 15, 1869 Hartwig, Estevan H. L., 62, *Palmaille, Antona, Hamburg.*

Nov. 30, 1874 Harvey, Henry, M.B., *High-street, Wavertree.*

Feb. 6, 1865 Hassan, Rev. E., *Alma-terrace, Sandown-lane.*

Nov. 13, 1865 Hayward, John Williams, M.D., 117, *Grove-street.*

Feb. 6, 1865 Hebson, Douglas, 13, *Tower Chambers*, and 58, *Bedford-street South.*

Oct. 19, 1874 Hetherington, J. Newby, 57, *Canning-street.*

Nov. 4, 1872 Hicks, Sibley, F.R.C.S., 2, *Erskine-street.*

Dec. 28, 1846 Higgins, Rev. H. H., M.A. Cantab., F.C.P.S., *Rainhill*, EX-PRESIDENT.

*Oct. 31, 1836 Higginson, Alfred, M.R.C.S., Surgeon Royal Southern Hospital, 44, *Upper Parliament-street*, VICE-PRESIDENT.

Mar. 22, 1869 Higgin, Thomas, 33, *Tower-buildings*, and *Huyton.*

Nov. 16, 1863 Holden, Adam, 48, *Church-street*, and 2, *Carlton-terrace, Milton-road.*

March 9, 1868 Holme, James, 10, *Huskisson-street.*

Nov. 30, 1874 Holme, Rev. Arthur P., *Tattenhall, near Chester.*

*Dec. 14, 1862 Holt, Robert Durning, 6, *India-buildings*, and 29, *Edge-lane.*

Jan. 24, 1876 Hughes, Lewis, 38, *St. Domingo Vale, Everton.*

*Nov. 13, 1854 Hunter, John, Member Historic Society, Pennsylvania, *Halifax, Nova Scotia.*

Dec. 13, 1875 Hutchinson, Joseph B., M.R.C.S., 77, *Upper Parliament-street.*

Dec. 15, 1873 Hutton, Henry, *Baltic-buildings, Redcross-street.*

Jan. 26, 1857 Hutton, David, 3, *St. George's-crescent*, and 61, *Canning-street.*

*April 29, 1850 Ihne, William, Ph.D., Bonn, *Villa Felseck, Heidelberg*, EX-PRESIDENT.

Feb. 23, 1857 Imlach, Henry, M.D. Edin., 1, *Abercromby-square.*

Oct. 19, 1874 Imlach, Francis, M.B., 1, *Abercromby-square.*

Nov. 28, 1864 Jeffrey, F. J.

Oct. 20, 1873 Johnson, Digby, Royal Insurance Office, *North John-street.*

Mar. 10, 1862 Johnson, Richard, *Queen-buildings*, and *Blundell Sands.*

Jan. 26, 1863 Johnson, Richard C., F.R.A.S., *Queen-buildings* and *Blundell Sands*, HON. TREASURER.

Feb. 24, 1868 Jones, Charles W., 3, *Childwall-road, Wavertree.*

*April 4, 1852 Jones, Morris Charles, F.S.A., F.S.A.Scot., 20, *Abercromby-square.*

Oct. 18, 1869 Jones, Wm. Bolton, 21, *South Castle-street.*

Nov. 30, 1874 Joseph, Rev. Morris, 67, *Canning-street.*

Oct. 2, 1865 Kendal, Robinson, 16, *Water-street*, and 178, *Bedford-street.*

Nov. 15, 1869 King, Jos., 13, *Exchange-alley W.*, and *Trelearen House, Blundell Sands.*

Nov. 1, 1869 Kinsman, W. N., 8, *Derwent-road, Stoneycroft.*

*Jan. 14, 1839 Lassell, William, F.R.SS. L. and E., F.R.A.S., 27, *Milton-street*, and *Wapping.*

Oct. 21, 1844 Lear, John, 14, *Cook-street* and *Stoneby Cottage, Stoneby Green, New Brighton.*

Nov. 3, 1873 Lee, Hamilton, (Messrs. Lee & Nightingale), *North John-street.*

Nov. 3, 1873 Lee, Harold (Messrs. Lee & Nightingale), *North John-street.*

Dec. 11, 1871 Leigh, Richmond, M.R.C.S.E., 141, *Park-road.*

Nov. 2, 1868 Lloyd, James, Vice-Consul, Argentine Confederation, 16, *Wellfield-Place, Peel-street, Prince's Park.*

Nov. 1, 1875 Lutschaunig, Alfred, 64, *Cable-street.*

April 17, 1865 MacCheane, Wm., M.R.C.S., 47, *Shaw-street.*

April 20, 1863 Marples, David, *Lord-street* and *Cable-street*, and 5, *Mount Grove, Oxton, Birkenhead.*

Nov. 14, 1870 Marples, Joseph, 28, *Leece-street*, and *Fernlee*, 51, *Whetstone Lane, Tranmere.*

Nov. 17, 1873 Marples, Josiah, *Melvill Chambers, Lord-street*, and *Broomfield, Egremont.*

Feb. 9, 1874 Marsden, Peter Crook, *Lymefield, Heaton, near Bolton.*

Feb. 24, 1868 Marsh, John, *Ran Lee, Rainhill.*

Jan. 21, 1839 Martin, Studley, 27, *Brown's-buildings*, and 177, *Bedford-street South.*

Feb. 20, 1871 Mason, Alfred H., F.C.S., 56, *Hanover-street*, and 311, *Upper Parliament-street.*

Nov. 2, 1874 Matheson, Rev. A. Scott, *Dunneyat, Stanley-road, Bootle.*

Feb. 5, 1844 Mayer, Joseph, F.S.A., F.R.A.S., F.E.S., *Pennant House, Lower Bebington.*

Nov. 17, 1873 Mellor, James, Jun., *Sefton House, Great Crosby.*

Dec. 14, 1874 Mellor, John, 2, *Church-road, Walton.*

Oct. 31. 1859 Moore, Thomas John, Corr. Mem. Z.S., Curator Free Public Museum, *William Brown-street*, VICE-PRESIDENT.

Nov. 15, 1869 Morgan, Alfred, 126, *London-road*, and 2, *Rathbone-terrace, Wellington-road, Wavertree*, HON. LIBRARIAN.

Jan. 8, 1855 Morton, George Highfield, F.G.S., 122, *London-road.*

April 16, 1849 Moss, Rev. John James, B.A., *Upton, Cheshire.*

Oct. 29, 1850 Mott, Albert Julius, 32, *Church-street*, and *Adsett Court, Westbury-on-Severn*, EX-PRESIDENT.

April 3, 1854 Mott, Charles Grey, 27, *Argyle-street, Birkenhead*, and *Cavendish-road, Birkenhead Park.*

Mar. 23, 1874 McCulloch, D. B., 23, *Queen-buildings, Dale-street.*

Dec. 14, 1874 Murphy, Martin, F.C.S., *College of Chemistry*, 96A, *Duke-street.*

*Oct. 21, 1867 Muspratt, E. K., *Seaforth Hall, Seaforth.*

Oct. 20, 1865 Nevins, John Birkbeck, M.D. Lond., M.R.C.S., Lecturer on Materia Medica, Royal Infirmary School of Medicine, 3, *Abercromby-square*, EX-PRESIDENT.

Feb. 6, 1865 Newton, John, M.R.C.S., 20, *Marmaduke-street, Edge-hill.*

Nov. 2, 1868 Norrie, Rev. B. A. W., M.A. Cantab., *The College School, Huyton.*

*Oct. 15, 1855 North, Alfred, 23, *Lansdown-Crescent, Notting-hill, London, W.*

Dec. 10, 1866 Owen, Peter (Farnworth & Jardine), *Liverpool and London-chambers.*

Feb. 21, 1870 Packer, James Macnamara, M.D., *Rose Cottage, Poplar Bank, Huyton.*

Nov. 2, 1874 Palmer, John Linton, F.S.A., F.R.G.S., Fleet Surgeon R.N., 24, *Rock Park, Rock Ferry.*

Dec. 15, 1873 Parnell, E, W., 19, *Deane-road, Edge-lane.*

Nov. 16, 1874 Parratt, John, 68, *Rodney-street.*

Mar. 8, 1869 Parratt, Thomas P., *Silverton, North Crosby-road, Waterloo.*

Jan. 9, 1871 Patterson, John, 16, *Devonshire-road, Prince's Park.*

Nov. 4, 1861 Philip, Thomas D., 48, *South Castle-street*, and *Holly-road, Fairfield.*

Dec. 28, 1846 Picton, James Allanson, F.S.A., Chairman of the Library and Museum Committee, 11, *Dale-street*, and *Sandy Knowe, Wavertree*, PRESIDENT.

Nov. 1, 1875 Picton, William Henry, *The Pines, Bromborough-road, Lower Bebington.*

Nov. 16, 1874 Pim, Edward, 41, *Tithebarn-street.*

April 30, 1866 Prag, Rev. Jacob, 35, *Mount-street.*

Mar. 18, 1872 Pringle, Adam, *Grove Park.*

Nov. 13, 1871 Proctor, Peter, M.R.C.S., and L.S.A. Lond., 18, *St. James's-road.*

Nov. 1, 1875 Prytherch, John, M.D., *Mitford-street, Netherfield-road North.*

*Jan. 22, 1866 Raffles, William Winter, 54, *Brown's-buildings*, and *Sunnyside, Prince's Park.*

Nov. 12, 1860 Rathbone, Philip H., *Liverpool and London Chambers* (H), and *Greenbank Cottage, Wavertree.*

Mar. 24, 1862 Rathbone, Richard Reynolds, 17, *Lancaster-buildings, Tithebarn-street,* and *Beechwood House, Grassendale.*

*Jan. 7, 1856 Rawlins, Charles Edward, 12, *Rumford-court, Rumford-place,* and *Rock Mount, Rainhill.*

Jan. 9, 1870 Rawlins, Gerald W., *Brook Cottage, Rainhill.*

*Nov. 17, 1851 Redish, Joseph Carter, 6, *Dingle-lane.*

Jan. 10, 1876 Reid, Alexander, Royal Insurance Office, *North John-street.*

Dec. 12, 1870 Rickard, Wm., LL.D., *Alverton House,* 86, *Upper Parliament-street.*

Jan. 11, 1875 Richardson, Joseph (Messrs. Laces & Co.) *Union-court,* and 98, *Bedford-street South.*

Nov. 29, 1869 Roberts, Isaac, F.G.S., 26, *Rock Park, Rock Ferry.*

Feb. 4, 1867 Robinson, Joseph F., 1, *Knowsley-buildings, Tithebarn-street.*

Oct. 4, 1869 Rogers, J. Frederick (Dart & Rogers), *The Temple, Dale-street,* and 8, *Onslow-road.*

Jan. 10, 1876 Rogerson, George Russell, F.R.A.S., F.R.G.S., 5, *Cook-street,* and *Waterloo Cottage, Waterloo.*

April 18, 1854 Rowe, James, 16, *South Castle-street,* and 105, *Shaw-street.*

Jan. 22, 1872 Russell, Edward R., "*Daily Post,*" *Lord-street,* and 53, *Bedford-street.*

April 7, 1862 Samuel, Harry S., 11, *Orange-court,* and 2, *Canning-street.*

Nov. 30, 1874 Samuel, William Hy., 145, *Upper Parliament-street.*

Mar. 19, 1866 Sephton, Rev. John, M.A., *Liverpool Institute.*

Nov. 2, 1868 Sharp, Charles, *Liverpool Institute.*

Nov. 16, 1863 Sheldon, E.M., M.R.C.S., 223, *Boundary-street.*

Oct. 29, 1866 Shimmin, Hugh, 56, *Cable-street*, and *Tue Brook, West Derby.*

Oct. 18, 1875 Simpson, James, 10, *Rumford-place.*

Nov. 7, 1864 Skinner, Thomas, M.D. Edin., *Dunedin House*, 64, *Upper Parliament-street.*

Dec. 10, 1866 Smith, Elisha (Henry Nash & Co.), 5, *India-buildings.*

April 4, 1870 Smith, James, 9, *Lord-street*, and *Ribblesdale Villas*, 22, *Merton-road, Bootle.*

Feb. 23, 1863 Smith, J. Simm, Royal Insurance Office, *Blount House, Croydon.*

Feb. 24, 1862 Snape, Joseph, Lecturer on Dental Surgery, Royal Infirmary School of Medicine, 75, *Rodney-street.*

April 20, 1874 Snow, Rev. T., M.A., 55, *Seel-street.*

Nov. 3, 1873 Snowdon, Christopher, H.M. Customs.

Jan. 24, 1876 Souttar, Robinson, Tramway Company, 8, *Castle-street*, and 18, *Christchurch-road, Claughton, Birkenhead.*

Nov. 12, 1860 Spence, Charles 4, *Oldhall-street.*

Feb. 10, 1862 Spence, James, 18, *Brown's-buildings, Exchange*, and 10, *Abercromby-square.*

Nov. 27, 1865 Spola, Luigi, LL.D., 85, *Boundary-lane, West Derby-road.*

Jan. 18, 1868 Stearn, C. H., Bank of England, *Castle-street*, and 3, *Eldon-terrace, Rock Ferry.*

Nov. 1, 1875 Stevenson, John, *Prince Alfred-road, Wavertree.*

Jan. 9, 1865 Stewart, Robert E., L.D.S., R.C.S., Dental Surgeon, Royal Southern Hospital, and Liverpool Dental Hospital, 37, *Rodney-street.*

Oct. 18, 1858 Stuart, Richard, 11, *Manchester-buildings*, and *Brooklyn Villa, Breeze Hill, Walton.*

*Feb. 19, 1865 Taylor, John Stopford, M.D.Aberd., F.R.G.S., 1, *Springfield, St. Anne-street.*

Jan. 23, 1843 Taylor, Robert Hibbert, M.D. Edin., L.R.C.S. Ed., Lect. on Ophthalmic Medicine, Royal Infirmary School of Medicine, 1, *Percy-street.*

Nov. 29, 1875 Tetley, John H., *Sunnyside*, 21, *Rock Park, Rock Ferry.*

Nov. 17, 1850 Tinling, Chas., *Victoria-street*, and 29, *Onslow-road, Elm Park.*

*Feb. 19, 1844 Turnbull, James Muter, M.D. Edin., M.R.C.P., Physician Royal Infirmary, 86, *Rodney-street.*

Oct. 21, 1861 Unwin, William Andrew, 11, *Rumford-place.*

Oct. 21, 1844 Vose, James Richard White, M.D. Edin., F.R.C.P., Physician Royal Infirmary, 5, *Gambier-terrace.*

Dec. 2, 1872 Waite, William Henry, D.D.S., L.D.S., 10, *Oxford-st.*

Mar. 18, 1872 Walker, George E., F.R.C.S., 43, *Rodney-street.*

Mar. 18, 1861 Walker, Thomas Shadford, M.R.C.S., 82, *Rodney-street.*

Jan. 27, 1862 Walmsley, Gilbert G., 50, *Lord-street.*

Jan. 9, 1865 Walthew, William, *Phœnix Chambers*, and *Vine Cottage, Aughton.*

Mar. 4, 1872 Ward, Thomas, *Brookfields House, Northwich.*

Dec. 13, 1869 Waterhouse, Harold, 37, *Catherine-street.*

Dec. 2, 1861 Weightman, William Henry, *Minster-buildings, Church-street*, and *Cambridge-road, Seaforth.*

April 7, 1862 Whittle, Ewing, M.D., Lecturer on Medical Jurisprudence, Royal Infirmary School of Medicine, 77A, *Upper Parliament-street.*

Jan. 8, 1872 Williams, Wellington A., 21, *Falkner-street.*

Jan. 11, 1875 Williams, George A., *Lombard Chambers, Bixteth-street.*

Nov. 1, 1875 Wilson, Ed. J., 14, *Durning-road.*

Nov. 2, 1874 Wolf, Jas. O. de (Messrs. T. C. Jones & Co.), 26, *Chapel-street.*

Mar. 18, 1861 Wood, George S. (Messrs. Abraham & Co.), 20, *Lord-street*, and *Bellevue-road, Wavertree.*

Nov. 14, 1870 Wood, John J. (Messrs. Abraham & Co.), 20, *Lord-street.*

Nov. 29, 1875 Yates, D. E., 9, *Rumford-place*, and 88, *Huskisson-street.*

Nov. 2, 1874 Young, Henry, *South Castle-street.*

HONORARY MEMBERS.

LIMITED TO FIFTY.

1.—1833 The Right Hon. Dudley Ryder, Earl of Harrowby, K.G., D.C.L., F.R.S., *Sandon Hall, Staffordshire*, and 39, *Grosvenor-square, London, W.*

2.—1836 The Most Noble William, Duke of Devonshire, K.G., M.A., F.R.S., F.G.S., &c., Chancellor of the University of Cambridge, *Devonshire House, London, W.*, and *Chatsworth, Derbyshire.*

3.—1838 Sir George Biddell Airey, Knight, M.A., D.C.L., F.R.S., Hon. F.R.S.E., Hon. M.R.I.A., V.P.R.A.S., F.C.P.S., &c., Astronomer Royal, *Royal Observatory, Greenwich.*

4.—1840 James Nasmyth, F.R.A.S., *Penshurst, Kent.*

5.—1841 Charles Bryce, M.D. Glasg., Fell. F.P.S.G., *Brighton.*

6.—1844 T. P. Hall, Coggleshall, Essex.

7.—1844 Peter Rylands, *Warrington.*

8.—1844 John Scouler, M.D., LL.D., F.L.S., *Glasgow.*

9.—1844 Thomas Rymer Jones, F.R.S., F.Z.S., F.L.S., Professor of Comparative Anatomy, *King's College, London.*

10.—1844 Sir Charles Lemon, Bart., M.A. Cantab., F.R.S., F.G.S., *Penrhyn, Cornwall.*

11.—1844 William Carpenter, M.D. Edin., F.R.S., F.L.S., F.G.S., Registrar, *London University.*

12.—1848 Rev. Thomas Corser, M.A., *Strand, Bury.*

13.—1850 Rev. Canon St. Vincent Beechy, M.A. Cantab., *Hilgay Rectory, Downham, Norfolk.*

14.—1851 James Smith, F.R.SS.L. and E., F.G.S., F.R.G.S., *Jordan Hill, Glasgow.*

15.—1851 Henry Clark Pidgeon, *London.*

16.—1851 Rev. Robert Bickersteth Mayor, M.A., Fell. of St. John's College, Cantab., F.C.P.S., *Rugby.*

17.—1852 William Reynolds, M.D., *Beech Lawn, Mossley Hill, Liverpool.*

18.—1853 Rev. James Booth, LL.D., F.R.S., &c., *Stone, near Aylesbury.*

19.—1857 Thomas Jos. Hutchinson, F.R.G.S., F.R.S.L., F.E.S., H.B.M. Consul, *Callao, Peru.*

20.—1861 Sir William Fairbairn, Bart., LL.D., C.E., F.R.S., *Polygon, near Manchester.*

21.—1861 Rev. Thomas P. Kirkman, M A., F.R.S., *Croft Rectory, near Warrington.*

22.—1865 The Right Rev. H. N. Staley, D.D., Bishop of Honolulu, *Sandwich Islands.*

23.—1863 Edward J. Reed, C.B., *Hull.*

24.—1865 George Rolleston, M.D., F.R.S., Linacre Professor of Physiology in the University of Oxford, *Oxford.*

25.—1865 Cuthbert Collingwood, M.A., and M.B., Oxon, F.L.S.

26.—1867 J. W. Dawson, LL.D., F.R.S., F.G.S., &c., Principal and Vice-Chancellor of McGill University, *Montreal.*

27.—1868 Captain Sir James Anderson, *Atlantic Telegraph Company, London.*

28.—1870 Sir John Lubbock, Bart., M.P., F.R.S., *High Elms, Farnborough, Kent.*

29.—1870 Henry E. Roscoe, F.R.S., Professor of Chemistry in Owens College, *Manchester.*

30.—1870 Professor Joseph Henry, Secretary to the Smithsonian Institute, *Washington, U.S.*

31.—1870 Sir Wyville Thompson, Knt., F.R.S., *Belfast.*

32.—1870 Joseph Hooker, M.D., F.R.S., *Royal Observatory, Kew.*

33.—1870 Professor Brown Séquard, M.D.

34.—1870 John Gwyn Jeffreys, F.R.S., 25, *Devonshire-place, Portland-place, London.*

35.—1870 Thomas H. Huxley, LL.D., F.R.S., Professor of Natural History in the Royal School of Mines, *Jermyn-street*, and 26, *Abbey-place*, *St. John's Wood*, *London*.

36.—1870 John Tyndall, LL.D., F.R.S., Professor of Natural Philosophy in the Royal Institution, *London*.

37.—1870 Rev. Christian D. Ginsburg, LL.D., *Binfield*, *Bracknell*, *Berks*.

38.—1874 Alexander Agassiz.

39.—1874 Frederick Max Müller, LL.D., Professor of Comparative Philology, *Oxford*.

40.—1874 Sir Samuel W. Baker.

CORRESPONDING MEMBERS.

LIMITED TO THIRTY-FIVE.

1.—1867 Albert C. L. Günther, M.A., M.D., Ph.D., British Museum, Editor of the "Zoological Record."

2.—1867 J. Yate Johnson, *London*.

3.—1867 R. B. N. Walker, *Gaboon*, *West Africa*.

4.—1868 Rev. J. Holding, M.A., F.R.G.S., *London*.

5.—1868 George Hawkins, *Colombo*, *Ceylon*.

6.—1868 J. Lewis Ingram, *Bathurst*, *River Gambia*.

7.—1869 George Mackenzie, *Cebu*, *Philippine Islands*.

8.—1870 Rev. Joshua Jones, D.C.L., King William's College, *Isle of Man*.

9.—1874 Samuel Archer, Surgeon-Major, *Honduras*.

10.—1874 Samuel Booker, *Georgetown*, *Demerara*.

11.—1874 Coote M. Chambers, *Burrard's Inlet*, *British Columbia*.

12.—1874 Edwyn C. Reed, *Museo Nacionale*, *Santiago de Chili*.

13.—1874 Millen Coughtrey, M.D., *New Zealand*.

14.—1875 Robert Gordon, Government Engineer, *British Burmah*.

ASSOCIATES.

LIMITED TO TWENTY-FIVE.

1.—Jan. 27, 1862 Captain John H. Mortimer, "America." (Atlantic.)

2.—Mar. 24, 1862 Captain P. C. Petrie, "City of London," Commodore of the Inman Line of American Steam Packets. (Atlantic.)

3.—Feb. 9, 1863 Captain James P. Anderson, R.M.S.S. "Africa," Cunard Service. (Atlantic.)

4.—Feb. 9, 1863 Captain John Carr (Bushby and Edwards), ship "Scindia." (Calcutta.)

5.—Feb. 9, 1863 Captain Charles E. Price, R.N.R. (L. Young & Co.), ship "Cornwallis." (Calcutta and Sydney.)

6.—April 20, 1863 Capt. Fred. E. Baker, ship "Niphon." (Chinese Seas.)

7.—Oct. 31, 1864 Captain Thomson, ship "Admiral Lyons." (Bombay.)

8.—Oct. 31, 1864 Captain Alexander Browne (Papayanni), S.S. "Agia Sofia." (Mediterranean.)

9.—April 13, 1865 Captain Alexander Cameron (Boult, English & Brandon), ship "Staffordshire." (Shanghai.)

10.—Dec. 11, 1865 Captain Walker, ship "Trenton."

11.—Mar. 23, 1868 Captain David Scott.

12.—Oct. 5, 1868 Capt. Cawne Warren.

13.—Oct. 5, 1868 Captain J. A. Perry.

14.—Mar. 22, 1869 Captain Robert Morgan, ship "Robin Hood."

15.—April 29, 1872 Captain J. B. Walker, Old Calabar.

16.—April 29, 1872 Captain Alfred Horsfall, S.S. "Canopus."

17.—Oct. 18, 1875 Captain John Slack.

ADDITIONS TO THE LIBRARY.

Date announced.		Donors.
1875.		
OCTOBER 18th.		
La Société Royale des Antiquaires du Nord, Copenhagen :—		
	Memoires (Nouvelle Série), 1866-74 - -	*The Society.*
	Atlas de l'Archæologie du Nord (4to.), 1860 -	*The Society.*
	Islendinga Sögur, 1875 - - - - -	*The Society.*
Geographischen Gesellschaft : Vienna :—		
	Mittheilungen, 1873-4 - - - - -	*The Society.*
La Société des Sciences Physiques et Naturelles de Bordeaux :—		
	Memoires (2e Série), tome 1 ; Cahier ii., 1875	*The Society.*
The Society of Natural History, Boston :—		
	Proceedings, vol. xvii., parts 1, 2 ; 1874 -	*The Society.*
	Memoirs : i. Recent Changes of Level on the Coast of Maine, by N. S. Shaler, 1874. ii. The Species of the Lepidopterous Genus *Pamphilia*, by S. H. Scudder, 1874 : iii. The Antiquity of the Caverns and Cavern Life of the Ohio Valley, by N. S. Shaler, 1875. iv. Prodrome of a Monograph of the *Tabanidæ* of the United States : part i. The Genera *Pangonia, Chrysops, Silvius*, etc., by C. R. Osten-Sacken, 1875 ; Obituary Notice of Jeffries Wyman, M.D., obit. 1874, by Dr. Asa Gray - - -	*The Society.*
The Peabody Museum of American Archæology, Cambridge, Mass. :—		
	Report, 1874 - - - - - -	*The Society.*

The American Association for the Advancement of Science :—
Proceedings, vols. ii.–xx., 1849–71 - *The Association.*
The Geological Survey of India, Calcutta :—
Memoirs, vol. x., part 2., and vol. xi., part 1, 1874–5 - - - - - - -
Palæontologia Indica (4to), Series x., parts 1–4, 1874 - - - - - - -
Records of the Survey, vol. vii., parts 1–4, 1874 - - - *The Governor-General in Council.*
The Essex Institute, Salem, Mass. :—
Bulletin vi., 1874 - - - - - *The Institute.*
Proceedings of the Academy of Natural Sciences of Philadelphia, parts 1, 2, and 3, 1874 - *The Academy.*
Det Kongelige Norske Universitet, Christiania :—
Die Ægyptischen Denkmäler in St. Petersburg, Helsingfors, Upsala, und Copenhagen, Von J. Lieblien, 1874 - -
Grundtrækene i den Ældeste Norske Proces, R. Hertzberg, 1874 - - - -
And several Pamphlets, &c. - - *The University.*
The American Geographical Society, New York :—
Bulletin, 1874–5; Memorial Bulletin, Dr. Livingston, 1874 - - - - -
Address of Chief Justice Daly on the Geographical Work of the World in 1873 - - *The Society.*
La Vie et les Œuvres de P. Chr. Asbjörnsen, Christiania, 1873 - - - - -
The Geographical Distribution of Animals and Plants, by C. Pickering, M.D., Washington, 1854 - - - - - - - - *The Author.*
The History of Paper-Hangings, &c., by G. H. Morton, F.G.S., Liverpool, 1875 - - *The Author.*
The Bombay Branch of the Royal Asiatic Society :—
Journal, no. 30, 1874, Bengal - - - *The Society.*
The Society of Antiquaries, London :—
Proceedings, vol. vi., part 4, 1875 - - *The Society.*

The Anthropological Institute, London :—
Journal, April and July, 1875 - - - *The Institute.*
The Royal Astronomical Society, London :—
Monthly Notices, vol. xxxv., nos. 6–8, 1875 *The Society.*
The Chemical Society, London :—
Journal, 148–158, April–Sept., 1875 - - *The Society.*
The Royal Geographical Society, London :—
Proceedings, vol. xix., parts 8–7, 1875 -
Journal, vol. xliv., 1874 - - - - *The Society.*
The Geological Society, London :—
Journal, vol. xxxi., parts 2–8, 1875 - - *The Society.*
The Institution of Civil Engineers, London :—
Proceedings, vols. xxi.–xli., 1861–75 - *The Institution.*
The Linnæan Society, London :—
Journal (Botany), nos. 78–80, 1875 - -
Journal (Zoology), no. 59, 1875 - - *The Society.*
The Royal Society of Literature, London :—
Transactions, vol. xi., part 1, 1875 - - *The Society.*
The Royal Asiatic Society, London :—
Journal, vol. vii., part 2, 1875, and 52nd Annual Report - - - - - *The Society.*
The Royal Society, London :—
Proceedings, nos. 160–2, 1875 - - - *The Society.*
The Meteorological Society of Scotland, Edinburgh :—
Journal for 1874 - - - - - *The Society.*
The Philosophical Society, Glasgow :—
Proceedings, 1874–5 - - - - *The Society.*
The Literary and Philosophical Society, Hull :—
Report, 1874–5 - - - - - *The Society.*
The Naturalists' Field Club, Liverpool :—
Proceedings, 1873–4–5 - - - - *The Club.*
The Royal Institution of Cornwall, Truro :—
Journal, vols. xvi.–xvii., 1874–5 - *The Institution.*
The Bristol Naturalists' Society :—
Proceedings, 1874–5 - - - - *The Society.*

1875.

NOVEMBER 1st.

The Smithsonian Institution, Washington:—
Report for 1873 - - - - - *The Institution.*

The Department of War, Washington:—
Report for 1874 (3 vols.) - - *The Secretary of War.*

The Department of Agriculture, Washington:—
Report for 1873 (2 vols.) - - - *The Commissioner.*

The United States Naval Observatory, Washington: Observations during 1872 (4to) - *The Astronomer.*

The United States Geological and Geographical Survey, Washington:—
i. The Cretaceous Flora of the Western Territories, by Leo Lesquereux, 1874. ii. Report of the Survey of Colorado, &c., 1873. iii. Hand-book of the Ornithology of the North West, by Elliott Coues, 1874 - - - - - - - *Dr. F. V. Hayden.*

The Zoological Society of Philadelphia:—
Report for 1874 - - - - - *The Society.*

The Franklin Institute of Philadelphia:—
Journal, March–Sept., 1875 - - - *The Institute.*

The Academy of Natural Sciences, Philadelphia:—
Proceedings, 1874 - - - - - *The Academy.*

The American Philosophical Society, Philadelphia:—
Proceedings, no. 93, 1874 - - - *The Society.*

Reale Instituto Lombardo, Milan:—
i. Memoires, 1. Classe di Scienze, Mathematiche, e Naturali, vol. xii., fascioli 5. e 6, 1873–4: 2. Classe di Lettere e Scienze, Morali e Politiche, vol. xii., fasciolo 4, 1873. ii. Rendiconti, Series ii., vol. v., fascioli 17–20, 1872; vol. vi., 1873; and vol. vii., fascioli 1–16, 1874 - - - *The Institute.*

The Royal Asiatic Society, London:—
Journal, vol. vii., part 2, 1875 - - - *The Society.*

The Geologists' Association, London :—
Proceedings, April–September, 1875 - *The Association.*
The Meteorological Society of Great Britain, London :—
Journal, 14 and 15, 1875 - - - - *The Society.*
The Statistical Society, London :—
Journal, vol. xxxviii., parts 1–3, 1875 - *The Society.*
The Royal Institute of British Architects, London :—
Transactions, 1873–4 - - - - *The Institute.*
The East Indian Association, London :—
Journal, vol. ix., parts 1 and 2, 1875 - *The Association.*
The Quarterly Journal of Science, London, nos.
46-48, 1875 - - - - - - *The Editor.*
The Natural History Society, Bath :—
Proceedings, vol. iii., part 2, 1875 - - *The Society.*
The Berwickshire Naturalists' Field Club, Alnwick :—
Proceedings, 1874 - - - - - *The Club.*
The Birkenhead Literary and Scientific Society :—
Report, 1874–5 - - - - - *The Society.*
Archæological Researches in Kentucky and Indiana,
in 1874, by F. W. Putnam, Boston, 1875 - *The Author.*
Notes on the *Ophidiidæ* and *Fierasferidæ*, by
F. W. Putnam, Boston, 1875 - - - *The Author.*
Notes on *Liparis* and *Cyclopterus*, by F. W.
Putnam, Boston, 1874 - - - - *The Author.*
Report of the British Association, Belfast Meeting,
1874 - - - - - - - - *Dr. Inman.*
Nature, to this date - - - - - - *The Editor.*

November 15th.

The American Academy of Arts and Sciences, Boston :—
Proceedings, New Series, vol. ii., 1874–5 - *The Academy.*
Harvard University, Cambridge, Mass. :—
Catalogue, 1874–5 - - - - -
Annual Report of the President for 1873–4.
Annual Report of the Treasurer for 1874 *The University.*

The American Association for the Advancement of Science :—
Proceedings, 23rd Meeting, 1874 - *The Association.*
The Society of Natural Sciences, Buffalo (New York) :—
Bulletin, vols. i.–ii., 1873–5 - - - *The Society.*
The Orleans County Society of Natural Sciences, Burlington, Vermont :—
Archives of Science, vol. i., 1870-4 - - *The Society.*
The Vermont Medical Journal, 1874 - - *The Editor.*
The American Philosophical Society, Philadelphia :—
Proceedings, no. 94, 1875 - - - *The Society.*
The Franklin Institute of Philadelphia :—
Journal, October, 1875 - - - - *The Institute.*
The United States Geological and Geographical Survey, Washington :—
Bulletin, 2nd Series, nos. 2 and 3, 1875 *Dr. F. V. Hayden.*
The Department of Agriculture, Washington :—
Monthly Reports for 1874 - - *The Commissioner.*
The Society of Arts, London :—
Journal, May to October, 1875 - - - *The Society.*
The Chemical Society, London :—
Journal, no. 154, October, 1875 - - *The Society.*
The Linnæan Society, London :—
Journal (Botany), no. 81, 1875 - - *The Society.*
The Royal Society, London :—
Proceedings, no. 168, 1875 - - - *The Society.*
The Zoological Society, London :—
Proceedings, parts 1–3, 1875 - - - *The Society.*
Science-Gossip, London, May-October, 1875 - *The Editor.*
Nature, to this date - - - - - *The Editor.*

NOVEMBER 29th.

On Polishing the Specula of Reflecting Telescopes, by W. Lassell, F.R.S., &c. - - *The Author.*

The Anthropological Society, London :—
Journal, no. 13, 1875 - - - - *The Society.*
The Royal Astronomical Society, London :—
Monthly Notices, vol. xxxv., no. 9, 1875 - *The Society.*
The Royal Medico-Chirurgical Society, London :—
Transactions, vol. lviii., 1875 - - - *The Society.*
The Pathological Society, London :—
Transactions, vol. xxvi., 1875 - - - *The Society.*
The Literary and Scientific Society, Birkenhead :—
President's Address, 1875 ; Rev. W. Binns on the Development of English Literature in its connection with the Literature of Europe *The Society.*
The Philosophical and Literary Society of Leeds :—
Report, 1874–5 - - - - - *The Society.*
The Geological Society, Liverpool :—
Proceedings, vol. iii., part 1, 1875 - - *The Society.*
The Philomathic Society, Liverpool :—
Proceedings, vol. xx, 1874–5 - - - *The Society.*
The Free Public Library, Manchester :—
Report, 1874–5 - - - - -
The Franklin Institute, Philadelphia :—
Journal, vol. lxx., part 5, 1875 - - - *The Institute.*
Reale Instituto Lombardo, Milan :—
i. Classe di Scienze Mathematiche e Naturali, vol. xiii., fasciolo i., 1874 : ii. Classe di Lettere e Scienze Morali e Politiche, vol. xiii., fasciolo i., 1874 - - - *The Institute.*
The Canadian Institute, Toronto :—
Journal, vol. xiv., part 5, 1875 - - *The Institute.*
The Quarterly Journal of Science, London, Oct., 1875 - - - - - - - - *The Editor.*
Science-Gossip, London, Nov. 1875 - - - *The Editor.*
Journal of the Society of Arts, London (to this date) - - - - - - - *The Society.*

DECEMBER 13th.

The Geological Society, London :—
Journal, vol. xxxi., part 4, Nov., 1875 - *The Society.*

The Geologists' Association, London :—
Proceedings, vol. iv., part 4, Nov., 1875 *The Association.*

The Linnæan Society, London :—
Proceedings, 1874–5 - - - - *The Society.*

The British Meteorological Society, London :—
Quarterly Journal, no. 16, Oct., 1875 - *The Society.*

The Royal Geological Society of Ireland, Dublin :—
Journal, vol. iv., part 2, 1874–5 - - *The Society.*

The Watford Natural History Society, and Hertfordshire Field Club, Watford :—
Transactions, vol. i., parts 1 and 2, 1875 - *The Society.*

Anledning af Schopenhauers af det Throndhjemske Videnskabers—Selskab belénnede Priis—Afhandling om den frie villies Forhold til Selvbendsthenden af M. J. Monad. Christiania, 1872 - - - - - - *The University.*

Science-Gossip, London, Oct. 1875 - - - *The Editor.*

1876.

JANUARY 10th.

Report of the Secretary of War on the Operations of the Department during the year ending 30th June, 1875, Washington - *The Secretary of War.*

Three Papers on "Ocean Circulation," by James T. Croll, Edinburgh, 1875 - - *The Author.*

The Royal Scottish Society of Arts :—
Transactions, vol. ix., parts 1 and 2, Edinburgh, 1874 - , - - - - - *The Society.*

The Royal Physical Society :—
Proceedings, 1874–5, Edinburgh - - *The Society.*

The Royal Cornwall Polytechnic Society, Falmouth :—
Report for 1874 - - - - - *The Society.*

The Royal Astronomical Society:—
Monthly Notices, London, Nov., 1875 - *The Society.*
The Chemical Society:—
Journal, London, Dec., 1875 - - - *The Society.*
The Royal Geographical Society:—
Journal, vol. xliv., London, 1874 - - *The Society.*
The Royal Microscopical Society:—
Journal, vol. xiv., London, 1875 - - *The Society.*
The Institution of Civil Engineers:—
Proceedings, vol. xlii., London, 1875 - *The Institution.*
The Royal Institution:—
Proceedings, vol. vii., parts 5 and 6, London, 1875 - - - - - - - *The Institution.*
The Royal Geological Society of Cornwall:—
Transactions, vol. ix., part 1, Penzance, 1875 *The Society.*
The Yorkshire Philosophical Society:—
Report for 1874 - - - - - - *The Society.*

JANUARY 24th.

The Natural History and Philosophical Society, Belfast:—
Proceedings, 1874–5 - - - - *The Society.*
The Royal Observatory, Greenwich:—
Observations during 1873 (4to.) - *The Government.*
The Anthropological Institute, London:—
Journal, no. xiv., 1876 - - - - *The Institute.*
The Chemical Society, London:—
Proceedings, Dec. 1875 - - - - *The Society.*
The Geologists' Association, London:—
Proceedings, vol. iv., part 5, 1875 - *The Association.*
The Royal Society, London:—
Proceedings, no. 164, 1875 - - - *The Society.*
The Quarterly Journal of Science, London, Jan., 1876 - - - - - - - - *The Editor.*
Science-Gossip, London, Jan., 1876 - - - *The Editor.*

The Natural History Society of Northumberland and Durham, Newcastle-on-Tyne :—
Transactions, vol. v., part 2, 1875 - - *The Society.*
The Yorkshire Philosophical Society, York :—
Report, 1874 - - - - - *The Society.*
Journal of the Society of Arts, London, to this date - - - - - - - - *The Society.*
Nature, to this date - - - - - - *The Editor.*

FEBRUARY 7th.

On a New Sponge of the genus *Luffaria*, from Yucatan, by Thomas Higgin - - - *The Author.*
The Plymouth Institution :—
Transactions, 1874–5 - - - *The Institution.*
The Asiatic Society of Bengal :—
Journal, August, 1875 - - - - *The Society.*
The Royal Astronomical Society, London :—
Monthly Notices, December, 1875 - - *The Society.*
The Royal Geographical Society, London :—
Proceedings, vol. xx., part 1, 1875 - - *The Society.*
The Architectural and Archæological Society, Liverpool :—
Proceedings, November and December, 1875 *The Society.*
The American Geographical Society, New York :—
Proceedings, vol. iv., 1875 - - - *The Society.*
The Canadian Institute, Toronto :—
Journal, vol. xiv., part 6, 1875 - - - *The Institute.*
Nature, to this date - - - - - - *The Editor.*

FEBRUARY 21st.

Der Königlichen Physikalisch - Ökonomischen Gesellschaft zu Königsberg, Schriften :—
Vierzehnter Jahrgang, 1873 - - -
Fuenfzehnter Jahrgang, 1874 - - - *The Society.*
The Royal Asiatic Society, London :—
Journal, vol. viii., part 1, 1875 - - - *The Society.*

The Royal Astronomical Society, London :—
Memoirs (4to), vol. xlii., 1873-5 - - *The Society.*
The Chemical Society, London :—
Journal, Jan., 1876 - - - - *The Society.*
The Royal Society, London :—
Proceedings, no. 165, December, 1875 - *The Society.*
The Statistical Society, London :—
Journal, vol. xxxviii., part 4, 1875 - - *The Society.*
Science-Gossip, London, February, 1876 - - *The Editor.*
Nature, London, February 3 and 10, 1876 - - *The Editor.*
The Society of Arts, London :—
Journal, January and February, 1876 - *The Society.*
The Free Public Library and Museum, Liverpool :—
Report, 1875 - - - - - *The Committee.*
The Franklin Institute, Philadelphia :—
Journal, vol. lxxi., part 1, 1876 - - *The Institute.*
The Literary and Philosophical Society, Whitby :—
Report, 1874–5 - - - - - *The Society.*

March 6th.

Philosophy without Assumptions, by Rev. T. P. Kirkman, M.A., F.R.S. - - - - *The Author.*
La Société des Sciences Physiques et Naturelles, Bordeaux :—
Memoires, tome 1 (2^{e} Série), 2^{e} cahier, et Extrait des Procès Verbaux des Seances, 1874–5 - - - - - - *The Society.*
The Royal Dublin Society, Dublin :—
Journal, vol. vii., 1875 - - - - *The Society.*
The Royal Astronomical Society, London :—
Monthly Notices, January, 1876 - - *The Society.*
The Chemical Society, London :—
vol. xiv., part 1, 1876 - - - - *The Society.*
The Geological Society, London :—
Proceedings, vol. xxxii., part 1, 1876 - *The Society.*

The United States Geological and Geographical Survey of the Territories:—
i. Descriptive Catalogue of the Photographs taken during the Expeditions, 1869–75.
ii. Bulletin of the Survey, 2nd Series, no. 5, Washington, 1876 - - - *Dr. F. V. Hayden.*

The Society of Arts, London:—
Journal, February, 1876 - - - - *The Society.*

Nature, London, February 17th and 24th, 1876 *The Editor.*

March 20th.

The Works of Sir Benjamin Thomson (Count Rumford), vol. iv, Boston, 1875 *The American Academy of Arts and Sciences, Boston.*

The Society of Natural Sciences, Buffalo, New York:—
Bulletin, vol. iii., part 1, 1875 - - - *The Society.*

The Museum of Comparative Zoology, Harvard, Cambridge, Mass.:—
i. Illustrated Catalogue (4to), no. 8, part 2: The *Ophiuridæ* and *Astrophytidæ*, by Theodore Lyman, M.D. ii. Annual Report of the Trustees, 1875 - - - *The Trustees.*

The Royal Scottish Society of Arts, Edinburgh:—
Transactions, vol. ix., part 8, 1875 - - *The Society.*

The Royal Geographical Society, London:—
Proceedings, vol. xx., part 2, 1876 - - *The Society.*

The Linnæan Society, London:—
Journal (Botany), nos. 60–2, 1875 - - *The Society.*

The British Meteorological Society, London:—
Journal, no. 17, 1875 - - - - *The Society.*

The Royal Society, London:—
Proceedings, no. 166, 1876 - - - *The Society.*

The East Indian Association, London:—
Journal, vol. ix., part 3, 1876 - - *The Association.*

The Literary and Philosophical Society, Manchester :—
Proceedings, vol. xiv., 1875 - - - *The Society.*
The American Geographical Society, New York :—
Bulletin, no. 1, 1876 - - - - *The Society.*
The U. S. Geological and Geographical Survey :—
Bulletin, no. 6, Washington, 1876 - *Dr. F. V. Hayden.*
Science-Gossip, London, 1st March, 1876 - - *The Editor.*
Nature, London, March 2nd and 9th, 1876 - *The Editor.*
Society of Arts, London :—
Journal, March, 1876 - - - - *The Society.*

April 3rd.

Ancient Faiths and Modern, by Thomas Inman, M.D., New York, 1876 - - - - *The Author.*
L'Académie Royale Suédoise des Sciences de Stockholm :—
i. Handlingar, (Mémoires,) 4to, Bandet ix, 1870; x, 1871, and xii, 1873. ii. Bihang. (Supplément aux Mémoires), Bandet i. Häftes 1–2, 1872–3, ib. ii.—1–2, 1874–5. iii. Öfversigt (Bulletin), Årgången 28–31, 1871–4. iv. Lefnadsteckningar, Bandet i. Häfte 3, 1873 - - - - - *The Academy.*
The Royal Asiatic Society, Bombay Branch :—
Journal, no. 31, Bombay, 1875 - - - *The Society.*
The Meteorological Society of Scotland, Edinburgh :—
Journal, nos. 47–8, 1875 - - - - *The Society.*
The Royal Astronomical Society, London :—
Monthly Notices, February, 1876 - - *The Society.*
The Chemical Society, London :—
Journal, vol. xiv., part 2, 1876 - - - *The Society.*
The Linnæan Society, London :—
Journal (Botany), no. 82, 1876 - - *The Society.*

The Watford Natural History and Hertfordshire Field Club :—
Transactions, vol. i., part 3, 1875 - - *The Club.*
The Smithsonian Institution, Washington :—
Report for 1874, &c., - - - *The Institution.*
Nature, London, March 16th and 23rd, 1876 - *The Editor.*

April 17th.

Richerchè Electro-Dinamiche sulle Rotazione Paleogeniche, &c. Francesco Orsoni. Noto, 1876 - - - - - - - - *The Author.*
The Museum of Comparative Zoology, Harvard, Cambridge, Massachusetts :—
Report for 1875 - - - - - *The Trustees.*
The Botanical Society, Edinburgh :—
Proceedings, vol. xii., part 2, 1876 - - *The Society.*
The Royal Society, Edinburgh :—
Proceedings, 1874–6 - - - - *The Society.*
The Geologists' Association, London :—
Report for 1875, and Proceedings, vol. iv., part 6, 1876 - - - - - *The Association.*
The Royal Society, London :—
Proceedings, no. 167, 1876 - - - *The Society.*
The Quarterly Journal of Science, no. 50, London, April, 1876 - - - - - *The Editor.*
The Astor Library, New York :—
Report for 1875–6 - - - - - *The Trustees.*
The State Library, New York :—
Report, vols. xlvi.–vii., 1873–4 - - - *The Trustees.*
The State Museum, New York :—
Report, vols. xxiii.–vi., 1869–72 - - *The Trustees.*
The State University, New York :—
Report, vols. lxxxvi.–vii., 1873–4 . *The University.*

The Royal Geological Society of Cornwall, Penzance :—
Report for 1875–6 - - - - - - *The Society.*
The American Philosophical Society, Philadelphia :—
Proceedings, no. 95, 1876 - - - *The Society.*
The Franklin Institute, Philadelphia :—
Journal, vol. lxxi., parts 2–4, 1876 - - *The Institute.*
The United States' Geological and Geographical Survey of the Territories :—
The Cretaceous Vertebrata (4to), by Professor E. D. Cope, Washington, 1875; and the Bulletin of the Survey, vol. ii, part 1, Washington, 1876 - - - *Dr. F. V. Hayden.*
Science-Gossip, London, April, 1876 - - *The Editor.*
Nature, London, April, 1876 - - - - *The Editor.*

LIST OF SOCIETIES, ACADEMIES, INSTITUTIONS, Etc.,

TO WHICH THIS VOLUME IS PRESENTED.

(*The Asterisk denotes those from which Donations have been received this Session.*)

Alnwick - - - - *Berwickshire Naturalists' Field Club.
Bath - - - - *Natural History Society.
Belfast - - - - *Naturalists' Field Club.
Belfast - - - - *Natural History Society.
Bristol - - - - *Naturalists' Society.
Birkenhead - - - *Free Public Library.
Birkenhead - - - *Literary and Scientific Society.
Bordeaux - - - *Société des Sciences, etc.
Bombay - - - - *Asiatic Society.
Boston - - - - *American Academy of Arts and Sciences.
Boston - - - - *Natural History Society.
Boston - - - - *The Massachusetts Boards of Agriculture, Education and State Charities.
Brussels - - - - Académie Royale des Sciences, etc., de Belgique.
Chester - - - - *Natural History Society.
Chester - - - - Architectural and Archæological Society.
Cambridge - - - Philosophical Society.
Cambridge - - - The Union Society.
Cambridge (*Mass.*) *Harvard University.
Cambridge (*Mass.*) *The Museum of Comparative Zoology.
Calcutta - - - *Royal Asiatic Society of Bengal.
Calcutta - - - *The Geological Survey of India.
Cherbourg - - - *Société Imperiale des Sciences, etc.
Christiania - - - *The University.
Copenhagen - - L'Academie Royale.
Copenhagen - - *La Société Royale des Antiquaries du Nord.

Dublin - - - - *Royal Irish Academy.
Dublin - - - - *Royal Geological Society of Ireland.
Dublin - - - - *Royal Society.
Edinburgh - - - *Scottish Society of Arts.
Edinburgh - - - *Botanical Society.
Edinburgh - - - *Meteorological Society of Scotland.
Edinburgh - - - *Royal Physical Society.
Edinburgh - - - *Royal Society.
Edinburgh - - - The Philosophical Institution.
Edinburgh - - - Geological Society.
Falmouth - - - *Royal Cornwall Polytechnic Society.
Glasgow - - - *Philosophical Society.
Glasgow - - - *Geological Society.
Greenwich - - - *The Royal Observatory.
Grieswald (*Prus.*) - The University—Dr. Julius Münter.
Hull - - - - Literary and Philosophical Society.
Halifax - - - Literary and Philosophical Society.
Königsberg - - - *Königlichen Physikalisch Gesellschaft.
London - - - - *Society of Arts.
London - - - - *Royal Asiatic Society.
London - - - - *Society of Antiquaries.
London - - - - *Anthropological Institute.
London - - - - *Royal Astronomical Society.
London - - - - British Association.
London - - - - British Museum.
London - - - - *Chemical Society.
London - - - - Clinical Society.
London - - - - *Royal Geographical Society.
London - - - - *Geological Society.
London - - - - *Geologists' Association.
London - - - - *Linnæan Society.
London - - - - *Meteorological Society.
London - - - - *Royal Society of Literature.
London - - - - *Royal Society.
London - - - - *Royal Institution.
London - - - - *Statistical Society.

London - - - - *Medico-Chirurgical Society.
London - - - - Royal Institute of British Architects.
London - - - - *Royal Microscopical Society.
London - - - - *East Indian Association.
London - - - - *Zoological Society.
London - - - - *Institution of Civil Engineers.
London - - - - *Editor of "Nature."
London - - - - *Editor of "Quarterly Journal of Science."
London - - - - *Editor of "Science Gossip."
London - - - - *Editor of "Geological Magazine."
Leeds - - - - - Philosophical and Literary Society.
Leeds - - - - - Geological Society of West Riding of Yorkshire.
Liverpool - - - Architectural Society.
Liverpool - - - *Historic Society.
Liverpool - - - *Geological Society.
Liverpool - - - *Philomathic Society.
Liverpool - - - Polytechnic Society.
Liverpool - - - *Naturalists' Field Club.
Liverpool - - - Chemists' Association.
Liverpool - - - *Numismatic Society.
Liverpool - - - Royal Institution.
Liverpool - - - *Free Public Library.
Liverpool - - - Medical Institution
Liverpool - - - Lyceum Library and News Room.
Liverpool - - - Athenæum Library and News Room.
Leicester - - - Literary and Philosophical Society.
Manchester - - - *Literary and Philosophical Society.
Manchester - - - *Free Public Library.
Manchester - - - Chetham Library.
Manchester - - - Owens College.
Manchester - - - *The Literary Club.
Melbourne - - - Royal Society of Victoria.
Milan - - - - *Reale Instituto Lombardo.
Newcastle-on Tyne - *Natural History Society.
New York - - - Astor Library.

New York - - - *American Geographical Society.
New York - - - *New York Academy of Sciences.
New York - - - State University.
New York - - - *State Library.
New York - - - *State Cabinet of Natural History.
New Haven - - Connecticut Academy.
Otago - - - - Otago University.
Oxford - - - Ashmolean Society.
Oxford - - - - *The Union Society.
Plymouth - - - *Plymouth Institute.
Penzance - - - *Royal Geological Society of Cornwall.
Philadelphia - - *American Philosophical Society.
Philadelphia - - *Academy of Natural Sciences.
Philadelphia - - *Franklin Institute.
Philadelphia - - *Zoological Society.
Philadelphia - - *Pennsylvania Board of Education.
Presburg - - - Vriens für Natur-Kunde.
Salem (*Mass.*) - - *Essex Institute.
Salem (*Mass.*) - - *American Association for the Advancement of Science.
Stockholm - - - *Academy of Sciences.
Southport - - - Literary and Philosophical Society.
Truro - - - - *Royal Institution of Cornwall.
Taunton - - - Somerset Archæological Society.
Toronto - - - - *Canadian Institute.
Vienna - - - - *Geographischen Gesellschaft.
Whitby - - - - *Literary and Philosophical Society.
Watford - - - *Natural History Society.
Washington - - *Naval Observatory.
Washington - - *The Commissioner of Patents.
Washington - - *The Commissioner of Agriculture.
Washington - - *Smithsonian Institution.
Washington - - *The Secretary of War.
Washington - - *The Geological Survey.
York - - - - Philosophical Society.

TREASURER'S ACCOUNT, 1874–5.

Dr. *The* LITERARY AND PHILOSOPHICAL SOCIETY, *in Account with* R. C. JOHNSON, *Treasurer.* Cr.

1874–5.	£	s.	d.
To Balance brought forward	2	15	5
To Cash paid T. Ray (Alterations)	19	0	0
" " Sewill & Co. (Clock)	3	15	0
" " D Marples & Co., Limited (Printing)	168	19	6
" " G. G. Walmsley (Printing)	10	7	0
" " Tinling & Co., ditto	14	13	0
" " W. Tomkinson (Bookcase)	25	0	0
" " Mrs. Johnson (Teas)	25	16	2
" " S. Burke (Attendance)	1	17	6
" " Secretary (Expenses)	18	3	11
" " " (Editorial Fee)	10	10	0
" " Treasurer for Sundries	0	5	0
To Balance in hand (Dock Bond)	250	0	0
	£545	12	6
To Balance	62	4	3

1874–5.			£	s.	d.
By Balance brought forward :—					
Dock Bond			£250	0	0
By Cash paid for Subscriptions :—					
174 Annual, at 21s.	182	14 0			
28 Entrance, at 10s. 6d.	14	14 0			
20 Arrears, at 21s.	21	0 0			
			218	8	0
By Cash on Account of Alterations :—					
From Naturalists' Field Club	2	2 0			
From Historic Society	2	2 0			
			4	4	0
By Cash, Interest on Dock Bonds			10	16	3
By Balance			62	4	3
			£545	12	6

Examined and found correct,
HARRY S. SAMUEL,
EDWARD DAVIES.

PROCEEDINGS

OF THE

LIVERPOOL

LITERARY AND PHILOSOPHICAL SOCIETY.

ANNUAL MEETING.—SIXTY-FIFTH SESSION.

ROYAL INSTITUTION, October 4th, 1875.

JAMES ALLANSON PICTON, F.S.A., PRESIDENT, in the Chair.

Mr. ALBERT JULIUS MOTT, the retiring President, occupied the Chair during that portion of the evening devoted to the usual business of the Annual Meeting.

The Minutes of the concluding Meeting of the previous Session were read and signed, after which the Honorary Secretary read the following

REPORT.

The prosperous condition of the Literary and Philosophical Society of Liverpool has undergone no material change during the past twelve months. At the commencement of the Session the number of ordinary members was two hundred and twenty. To these were added, by election, thirty others; but the deaths of four members, and the resignations of fifteen, the majority of whom left the neighbourhood, have diminished this accession, and the Society now musters two hundred and thirty-one ordinary members on its roll.

Of the four gentlemen deceased, Mr. W. J. Lamport, to whose memory the Society paid an appropriate tribute when recording his death in the minutes, had been a member for twenty-six years. Mr. Roger Lyon Jones had been on the roll for twenty-three years; and Mr. Jas. Fitzherbert Brockholes for nineteen years. At one time, Mr. Brockholes took an active part in the proceedings of the Society; and the results of his observations on the Entomology and Ornithology of the Cheshire district were frequently brought before the notice of the members. Four of his contributions on these subjects will be found in the eleventh, twelfth, fourteenth, and eighteenth volumes of the Society's Proceedings, one of them being an elaborate list of the Lepidoptera of the Hundred of Wirral. Nearly all the gentlemen who resigned were elected in recent years. Two of them, however, have been transferred to the list of Corresponding Members, for reasons which will be stated presently; and of the remainder, three gentlemen, namely, Mr. H. H. Statham, the Rev. W. H. Dallinger, and the Rev. W. A. Whitworth, M.A., have left behind them substantial evidence of their connection with the Society, in the form of valuable contributions to its volumes of Proceedings.

The death of Dr. J. E. Gray, F.R.S., keeper of the Zoological Collection in the British Museum, has reduced the number of Honorary Members to forty; and the list of Corresponding Members has been extended to fourteen by the election of three gentlemen, two of whom, as just stated, were previously Ordinary Members. Dr. Millen Coughtrey and Mr. Robert Gordon, the gentlemen referred to, had both contributed to the Society's Proceedings, the former by various communications on Comparative Anatomy, and the latter in particular by his translation of the inscription on the Burmese bell in the Free Museum. It was considered, therefore, that their removal abroad, and their appointment

to public positions which would give them facilities for still rendering good service to literature and science, was a fitting opportunity, not only of recognising their efforts on behalf of the Society, but of securing their continued interest in its labours, by recommending them for election as Corresponding Members.

The third of the newly-elected Corresponding Members is Mr. Edwin C. Reed, of the National Museum, Santiago, from whom an interesting communication on the habitat of the Vicuna was received in April last. This and other communications from Corresponding Members, received at the same time, will be found in the Society's forthcoming volume of Proceedings.

While the Council is thus able to point with satisfaction to the good work done by many among this class of the members, it is also glad to report that the Associates, the number of whom remains unaltered, are equally zealous in the collection of specimens, and in the acquisition of valuable information relative to the natural history of the marine fauna.

The Papers which were read at the meetings of the past Session were of considerable interest. The volume containing them has passed through the Press, and will shortly be ready for distribution.

During the last twelve months, the Library has received many valuable donations, among which may be named—A complete series of the Indian Geological Survey; the publications of the Museum of Comparative Zoology, in Cambridge, Massachusetts, which include the Revision of the *Echini*, by our recently-elected Honorary Member, Alexander Agassiz; and a full set of the Proceedings of the Institute of Civil Engineers, London, from 1860 to 1875.

The receipt of these works, in addition to the usual donations, together with the completion of the series of many

Transactions and scientific publications formerly defective, has rendered necessary the purchase of a new book-case, sufficiently large to meet the Society's requirements for some time to come. The Council has, therefore, great satisfaction in directing the attention of the members to the Library, which is in better order than at any former period.

The Council concludes its Report with the recommendation of the following members for election on the new Council:—Messrs. B. L. Benas, Birch, and Hetherington, Dr. Drysdale, and the Rev. J. Alden Davies.

The Honorary Treasurer next submitted his Annual Statement of Accounts, which was passed on the motion of Mr. King, seconded by Mr. Baruchson.

The following office-bearers and ordinary Members of Council were then elected to serve for the ensuing year:—Vice-Presidents — Alfred Higginson, M.R.C.S., Thomas J. Moore, Cor. Mem. Z. S. L., John J. Drysdale, M.D., M.R.C.S., F.R.M.S.; Honorary Treasurer — Richard C. Johnson, F.R.A.S.; Honorary Secretary—James Birchall; Honorary Librarian—Alfred Morgan; Members of Council—J. Campbell Brown, D.Sc., etc., Alfred E. Fletcher, F.C.S., W. Carter, M.B., Rev. E. M. Geldart., M.A., Edward R. Russell, Edward Davies, F.C.S., C. H. Stearn, George H. Morton, F.G.S., Rev. Jacob Prag, Baron Louis Benas, James Birch, J. Newby Hetherington, Rev. J. Alden Davies, James Smith.

The Associates of the Society were next re-elected.

The retiring President then vacated the Chair, and Mr. Picton having taken his place, it was moved by the Rev.

Henry H. Higgins, M.A., seconded by Dr. Nevins, and carried unanimously—

"That the cordial thanks of this Society be given to Mr. Albert Julius Mott, for the able and graceful manner in which he has performed the duties of President, and for the exceedingly valuable addresses he has given to the members during his term of office."

Mr. MOTT having replied, the PRESIDENT read his First Inaugural Address,* which was followed by a hearty vote of thanks.

Ladies were present at this Meeting.

FIRST ORDINARY MEETING.

ROYAL INSTITUTION, October 18th, 1875.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Ladies were present at the Meeting.

Messrs. James Simpson and Philip A. Hale were elected ordinary members.

The proceedings took the form of a *Conversazione* on Natural Science.

Mr. THOMAS HIGGIN, F.L.S., read the following Paper, "On some Sponges recently presented to the Free Museum," specimens of which were exhibited in the room:—

Our friend, Mr. Moore, possesses the happy art of kindling in the breasts of many of our townsmen, whose business or pleasure takes them to other lands, a taste for inquiry into the natural history of the countries they visit; and, consequently, he is continually receiving from his numerous friends so situated contributions valuable both to the Museum

* See page 1.

and to science. Amongst such contributions lately received have been several species of sponges which are worthy of notice. One, a large trumpet-shaped sponge, standing nearly four feet high, was collected at Ambergris Island, coast of Yucatan, by Dr. Barry, Staff-Surgeon at Corosal, and by him given to Staff-Surgeon-Major Samuel Archer, stationed at Belize, who presented it to the Museum. It proves to be new to science; and at present this fine specimen, which has thus come into the possession of the town of Liverpool, is the only one known to exist in any public collection. It is in excellent condition, and great praise is due to the gentlemen above named for the care bestowed upon its preservation, and also in its transmission to this country.

On presentation to the Museum, Mr. Archer gave the sponge the appropriate name of *Neptune's Trumpet*, and this name has been preserved, although it has been necessary to give it as well a specific name in placing it in the group to which it properly belongs; and, in giving it a name by which the species shall in future be known, it has been thought desirable, out of compliment to Mr. Archer, who never loses an opportunity of collecting anything which may be interesting and valuable to the Museum of his native town, to associate his name with it; consequently it has been duly christened *Luffaria Archeri*, and under this style its existence and its characteristic features have been made known in *The Annals and Magazine of Natural History*, to the September number of which I beg to refer those who may desire to cultivate an intimate acquaintance with our tall friend.

It is hollow throughout, the walls of the tube being of nearly equal thickness. The tube increases in diameter as it increases in length, and has been likened by Mr. Frank Archer to the large Alpine horn with which tourists in Switzerland are familiar—used there to awaken the mountain

echoes; and if Neptune ever needed to hold converse with his friends at a distance, he would no doubt use a speaking-trumpet of this model shape to make himself heard above the roar of the tempest.

This sponge is a keratose or horny-fibred one, and belongs to a group to which the name of *Luffaria* has been given, because of the similarity of the appearance of its fibrous skeleton, when deprived of its dark-coloured sarcode, to the fibrous skeleton of the fruit of the gourd *Luffa* when denuded of *its* fleshy substance, a fruit which is used as a sponge in the West Indies, in those places where the common sea-sponge is not readily obtainable. This "vegetable sponge," as it has been called, has lately been introduced into this country as an article of commerce, and may be purchased at the druggists' shops, where it is sold as a flesh brush for use in the bath.

The skeleton network of the group *Luffaria* consists of clear amber-coloured hollow fibre, the hollow core of which has a lining or coating of fine granules. This fibre differs from that of the common sponge of commerce, in being amber-coloured, hollow, and rigid, the fibre of the sponge suitable for domestic purposes being solid and resilient. Both species have very dark-coloured sarcode; and we have, fortunately, this evening, an opportunity of seeing a specimen of *Luffaria* and one of the common resilient sponges of commerce, growing on the same base, side by side. This mass of sponges, of which these two species are the most prominent, was lately obtained by that untiring searcher, Captain J. A. Perry, in shallow water, at Miragoāne, Hayti; and, as they remain in the state in which they were when taken out of the water, having simply been dried, most of the sarcode remains adhering to the fibrous skeletons. The *Luffaria*, I need hardly say, is the tubular sponge, the common sponge being the rounded mass, covered with a

leathery skin. It is difficult to conceive, perhaps, that this ugly-looking lump can be anything like one of our nice clean bath sponges; but, if we were to wash away with water its dirty-looking sarcode, we should then have no difficulty in recognising in the horny skeleton that would remain, one of the open-textured West India sponges of commerce.

In this same group of sponges is one which is new to science; but its locus as to classification must remain for the present *sub-judice*. It is a straggler between the two groups, *Suberitida* and *Pachytragida*, and possesses flesh spicules which are peculiar to it, and are not known to occur in any other sponge. I am inclined so far to place it in the family *Stellettina*, pachytragous sponges with star-shaped spicules, chiefly congregated in the dermal covering, or as a dermal crust. It is very insignificant-looking, and therefore I will not draw your further attention to it.

The fragmentary black branched sponge, also presented by Captain J. A. Perry, is likewise new to science. It is one of the *Halichondroid* sponges, but it is remarkable in possessing the multihamate or birotulate spicule, a form which has hitherto only been found amongst the *Hexactinellid* sponges, and the presence of this form of spicule in sponges of this group is of much interest. On account of this peculiarity, it has been thought advisable to give it the specific name *birotulata*. It will therefore be called *Halichondria birotulata*. Since I have drawn the attention of Mr. H. J. Carter to it, the same spicule has been found in one of the *Porcupine* Expedition sponges, described by him under the name *Halichondria abyssi*.

Another specimen to which I propose to draw your attention this evening is one which Captain Perry has recently brought from Savanilla, coast of New Grenada. It is a beautiful variety of a sponge which has been found on our own coasts, and is described by Dr. Bowerbank, in his

Monograph of. British Sponges, as *Hymeniacidon macilenta*. Its skeleton spicules are subpinlike fusiform acuate, and also large inequianchorates and bihamates, the flesh spicules being minute bihamates and minute equianchorates.

The skeleton is a network of fibre, composed of bundles of the pin-shaped spicules, held together by a minimum quantity of hornified sarcode. The surface of the sponge is a beautiful reticulation of fascicles of these spicules arranged in hexagonal areas, with lines from each of the angles of the hexagon meeting in its centre. Over this is stretched the dermal covering, studded with minute equianchorate and bihamate spicules, and pierced in the interstices of the network with pores. Large, simple, and contort bihamates are found on the skeleton lines, and the general network is also ornamented with rosettes, composed of the inequianchorates arranged in circles, with the small ends inwards. This is a beautiful feature in the skeleton of this sponge.

The only other sponge to which I shall have time to allude is a curious prickly-branched one, lately purchased by the Museum. It was first named from a mere fragment, by the late Dr. J. E. Gray, and by him was called *Axos Cliftoni;* and, afterwards, a fine example was described by Dr. Bowerbank, in the *Proceedings of the Zoological Society*, as *Dictyocylindrus Cliftoni*. The sponge is a very rigid one, and the skeleton is made up of bundles of pin-shaped spicules, held together by very strong rigid horny material. Our specimen is, however, a variety of the one described by Dr. Bowerbank. The outward forms of both are very similar, and the skeleton spicule is of the same form in each; but the flesh spicules differ very much. In Dr. Bowerbank's sponge, the flesh spicule is rosette-like, of the Maltese cross pattern, while those of our variety are more of a stellate form, the ends of the rays being furnished with round knobs or spheres studded with small conical spines thickly placed together.

modification, that generic distinctions have been founded upon it; but in a sandstone cast like the present example, such characters would have been obliterated. Still the position of the siphuncle is visible in the centre of each septum, where the specimen is broken across. About the apex the siphuncle is central, but in the lower septa it is subcentral, probably in consequence of external pressure. The specimen closely agrees with Sowerby's* *Orthoceras giganteum*, excepting that in his figure the siphuncle is subcentral, and the exterior presents a smaller apical angle than the Sweeney specimen. It is a question whether a *slight* difference in the position of the siphuncle is of much importance; if it is, the specimen is not Orthoceras giganteum, but a new species of Orthoceras. So far as the apical angle is concerned, it is not of much importance, for it varies in the same species.†

Of equal interest with the size of the specimen is the occurrence of the Orthoceras in the Millstone Grit, for it is the only Cephalopod recorded from the formation, and it is an important species in the comprehensive list of fossils described from the Sweeney Sandstone by Messrs. Prosser and Davies.

The Orthoceras was found in the highest beds of the Millstone Grit, which, however, seem to represent Yoredale strata of other districts.

Dr. CARTER next presented a communication on "The Influence of Anæsthetic Agents on Insect-devouring Plants," which he illustrated by some interesting experiments.

Mr. T. MELLARD READE, F.G.S., exhibited diagrams of Sections of the Boulder Clay at Bootle Lane and the Cliffs of

* *Min. Conc.*

† Since this description was in type, Mr. Morton has seen a somewhat larger specimen in the Hunterian Museum of the University of Glasgow; and Dr. Ferd. Roemer, of Breslau, has informed him that he has correctly named the Sweeney specimen as *Orthoceras giganteum*.

Blackpool, and made observations thereon. The President also added some remarks on the Glacial Periods of North-western Europe.

The following Paper was read by Mr. F. P. MARRAT, and selections exhibited of the shells referred to :—

"A Brief History of the Collection of Shells of the genus *Oliva*, or *Olives*, recently purchased from Mr. F. P. Marrat, by the Committee of the Free Public Library and Museum of Liverpool."

Some ten or twelve years ago, Mr. Reeve, the author of the *Conchologia Iconica*, sold his collections of shells at the rooms of Mr. Stevens, King Street, Covent Garden, London. At this sale I purchased rather largely, and afterwards found several of the type shells figured in Reeve among my lots; more particularly was this the case in the genus *Oliva*. Many of the smaller species were separately and securely enclosed in pill-boxes, and named. At this time I knew very little of the shells comprising this extensive genus. The smaller *Cypræa* (*Trivia*) accompanying these were many of them belonging to species rare and difficult to procure; and I thought such might also be the case with the Olives, therefore I put them in safe keeping for some future time.

M. Rubilliard sent an extensive collection of shells to the same rooms, some five or six years after Reeve's sale mentioned above, and amongst these were ten lots of Olives, the finest series I had then seen; and even now they stand boldly out as prominent shells in the collection. I debated the point with myself, whether I should secure the whole, or allow them to be scattered broadcast. The result was that, after some spirited bidding, the whole of the lots were mine. I have since learned that M. Rubilliard had selected these shells from thousands of specimens caught in the neighbourhood of the Mauritius.

The method of fishing for these and similar molluscs was

related to me by Sir David Barclay, Bart., a gentleman who has often been engaged in this work, and who is well acquainted with M. Rubilliard. A line, with three or four strings attached, is baited with pieces of fish—one of the principal of these is the cat-fish—and thrown into the sea, where it is allowed to remain sufficiently long for the molluscs to settle down to their feast. When the line is hauled in they will be found to stick fast to the bait. A similar operation may be seen on our pier-head, when boys are fishing for crabs.

The impulse given by my obtaining the splendid shells mentioned above induced me to purchase largely, not only with a view of acquiring the shells similar to those figured as species, but also any varieties that might be found to differ from the type forms. After several years' careful study, the fame of my collection became widely spread, and I received specimens from various collectors in Europe, who were anxious to have their shells named correctly. In most cases they gave me the privilege of selecting from specimens so sent.

Many beautiful varieties were obtained by friends dredging on the West Coast of Africa, commencing at Madeira, and continuing these operations, as opportunities offered, all along the coast as far as Corisco Bay.

Either by purchase or otherwise the finest shells, selected from almost every lot imported, found their way into my drawers, until it required at least twenty to hold them.

Every visit to London enabled me to add to the stock some little. Either shells have come in excelling in size or quality anything previously collected, or some hitherto unknown beautiful variety was selected by the experienced eye from among a hundred others.

Correct localities have been obtained through the instrumentality of masters of vessels of our mercantile marine,

who have brought shells from several places from which they had not been previously recorded; and the service rendered by the sailing masters in the employ of Herr Godeffroy, of Hamburg, has been very useful.

As my opinions regarding specific value have not appeared in any of my Papers, I may be allowed to express them here.

Specific differences, confined within limited areas, constitute the exceptions, not the rule. In almost every case, when the shells can be obtained in numbers, they approach the so-called species above and below them, so as to render it a matter of uncertainty whether they should constitute a variety of the one or the other. It is only in extreme cases we find marked differences existing. Rare specimens, when two or three are all that have been procured, present these great differences. In this collection, many of the shells allied to the *O. Timorea*, Duclos, vary in an extraordinary way, no two of these being similar to each other.

Form was believed by the late Hugh Cuming to be indicative of specific character; but, in the shells just mentioned, the form is quite as variable as the marking. Shells will *not* be confined within specified limits, and all attempts at classification must be defective. I fear the study of the animals will not prove to be of a much more satisfactory nature, when we have obtained as much information on the numerous varieties as that which exists in the case of the shells.

We will next enquire how this collection will bear comparison with other and similar collections, formed on the Continent or in England. Duclos published a *Monograph* on this genus in the year 1835, in which book are represented all the finest shells contained in the celebrated collections of the French conchologists, and a hundred and eleven recent and twenty-six fossil species are described in this work.

We know of no other series of Olives having been made since that date; nor has anything of importance appeared in any of the Continental Conchological magazines. We may thus fairly infer that these are the choicest specimens in the European cabinets, and our shells will compare most favourably with any of the published figures.

Mr. Reeve published his *Monograph* in the year 1850, when the fine collections of H. Cuming and Miss Steere were selected as containing the choicest shells in this genus England could supply. A few other private cabinets, such as those in the possession of Mr. Cole and Mr. Metcalf, were examined, and a few choice varieties were thus obtained for his *Monograph*.

These were considered at the time the finest specimens known to English conchologists.

Mr. Reeve's book contains ninety-nine species, several of Duclos' specimens being considered by this author to be varieties of well-known shells. If we examine the subsequent works published on Conchology, we shall find very little information on the Olives. With the exception of a few small species from Australia, described by Mr. Angas and one or two others, nothing has since been done in this genus.

A comparison may be made by placing the shells selected from the Museum collection, or their figured representatives, by the side of the figured shells supplied from the English and French collections, when it will be found that our specimens, belonging to the respective varieties, are superior to those figured elsewhere:

1st. In size of specimen.

2nd. In beauty of marking.

3rd. In condition. (That is, our shells are highly polished, fresh as if just taken from the sea.)

Lastly, there are numerous varieties of which neither

figures nor descriptions are to be found in any of the works on Conchology.

As an extensive series, no public or private collection can be compared with this; nor do I think that, if selections could be made from every known source, and placed together in one large group, such a series would be found to equal the collection now in the Liverpool Museum.

In my *Monograph* on the genus *Oliva*, published in Sowerby's *Thesaurus Conchyliorum*, in 1871, two hundred and twenty species are figured, all of them, with the exception of less than a dozen, from specimens in the above collection.

Mr. T. J. Moore exhibited the following selection from recent additions to the Free Public Museum :—

1. A fine tusk of the Siberian Mammoth (*Elephas primigenius*), purchased of Mr. Edward Charlesworth, F.G.S., who obtained it from a sale of ivory, recently imported to London from Siberia. Further consignments are reported to be doubtful, owing to the quantity being insufficient to make a remunerative sale. Such importations seem to have been made as far back as the earlier part of the last century.*

The tusk now in the Museum measures eleven feet in length, following the outside curvature; and in greatest girth, one foot six inches. The weight is a hundred and twelve pounds. It has the characteristic double or spiral curve; is brown in colour; is very nearly perfect, wanting only a very few inches at apex and base; and, excepting about one-third of the surface, is as sound as recently imported elephant tusks from India or Africa.

A small cup, or tazza, made from similar Siberian ivory, was shown with the tusk.

* See Owen, *British Fossil Mammals and Birds*, 1846, p. 249, quoting from the *Philosophical Transactions*, No. 446, 4to, 1737, p. 128.

2. Egg-sacs and spawn of various Molluscs (*Ampullaria, Pyrula melongena, Strombus gigas*, etc.), and specimens of nine species of Crustacea, from Honduras, collected and presented by Staff-Surgeon-Major Samuel Archer, Corresponding Member of the Society.

3. Skulls and bones of three specimens of Pouched Rats (*Geomys bursarius?*), collected and presented by Mr. James Roe, Assistant Commissary, Northern District, British Honduras.

4. Two young specimens, under six inches in length, of a rare fish, allied to Spinola's Deal Fish (*Trachypterus Spinolæ* of Cuvier and Valenciennes), taken at Malta, one in the spring of 1874, and the other on Jan. 19th, 1875, by Mr. C. A. Wright, who gave them to Capt. Horsfall, s.s. *Canopus*, Associate of the Society, by whom they were presented to the Museum, with various other marine specimens.

5. Specimens of Balani and Mangrove Oysters, with particulars of growth, collected and presented by Capt. J. Slack, Associate of the Society.

In the summer of 1874, Capt. Slack sailed for the River Gambia, in command of the steam dredge *Hercules*. She arrived in the Gambia, August 18th, 1874, and sailed thence Jan. 20th, 1875, for Rio Janeiro. Just before leaving the Gambia, Capt. Slack scraped from the hull of the *Hercules* a number of Mangrove oysters (*Ostrea parasitica* of Gmelin), which averaged two inches in greatest diameter of shell. Upon them were numerous small Balani of undetermined species, and a few others of a larger kind (*Balanus tintinabulum*, Linn., variety), measuring very nearly an inch in diameter of base, and the same in height. These dimensions must have been attained within the period of five months (Aug. 18th to Jan. 20th) above named.

In addition to the above were four specimens of Balani

from the bottom of the boat belonging to the *Hercules*, taken after the boat had been only twenty-one days afloat on the Gambia. One specimen, *Balanus radiatus*, Sowerby, measures five-eighths of an inch in longest diameter of base; and the other three, *Chelonobia testudinaria*, Linnæus, variety, vary from three-quarters to one inch in longest diameter of base. The names above given have been kindly supplied by Mr. F. P. Marrat.

6. A fine example, in obverse and reverse, of a large fossil fish, *Dapedius punctatus*, from the Lias, at Stone, Staffordshire, presented by Mr. R. Neilson. Length of fish, seventeen inches.

The Rev. H. H. Higgins then read the following Paper on "Our Social Wasps," with a note on a specimen of Polistes, taken at Ince Blundell:—

The true social wasps in this country are not of many kinds. In the south of Europe the species are more numerous, and in Brazil they are abundant. During an excursion of the Liverpool Naturalists' Field Club, in August last, to Ince Blundell, a member of the club, Mr. W. H. Mountfield, of the Liverpool, London and Globe Insurance Office, brought me a hymenopterous insect which he had just taken. It was, I felt sure, of a kind not known as a British species. Subsequently, on comparing the insect with "Monographie des Guêpes Sociales," by M. de Saussure, at the Liverpool Museum, I felt no doubt that the insect belonged to the genus *Polistes*, of which we have no native examples, and, with Mr. Mountfield's kind permission, the insect was sent to Mr. Frederick Smith, of the British Museum, who wrote as follows. "A few years ago specimens of a South American species of Polistes were taken at Penzance, in Liverpool, and in the London Docks. Those found at Penzance were fully accounted for. A vessel laden

with raw hides entered the harbour, and numbers of the Polistes were imported. A lady, whose house had windows at the back facing the harbour, took several in her bedroom and sent them to me. The captain of the vessel said that when they left Rio the flies swarmed on deck, and many accompanied the vessel throughout the voyage." Mr. Smith considers the Ince Blundell specimen to be *Polistes binotatus* of De Saussure, a native of Brazil, which does not appear to have previously been taken in England.

The social wasps of Britain have been figured and described in a work, not half so well known as it deserves to be, by Dr. Ormerod, published in 1868 by Longmans & Co. There are only seven species, of which the largest is the hornet, an insect generally regarded with fear and aversion, but capable of being domesticated and utilised as a household pet: see a paper in the *German Entomological Magazine*, by Pastor Muller, 1817. The following brief account, mainly from Dr. Ormerod's book, refers to the common wasp, *Vespa vulgaris*. The large wasps we see during the first warm days in spring are females, or mother wasps, which have passed the winter in concealment. What with late frosts, rains, birds, and little boys, comparatively few of the wasps which have lived through the winter survive to become the founders of colonies. When at last the wanderings of the future queen have come to an end, and she has discovered a hole or a branch to suit her taste, she enters on the work of her life. The first rudiments of the nest that is to be appear in the form of a little grey cap, suspended by the button at the top from a root or branch. Within the cap, with their openings downwards, are constructed four shallow cells, in each of which an egg is firmly glued. These cells are deepened as the enclosed eggs are hatched, an event attended with the earliest perils of wasp-life, the peril of dropping out of their cradles. Some perish in this way,

notwithstanding the admirable prehensile appliances with which the larva is furnished, consisting of the future mandibles at one end and a kind of disc at the other. The first perfect insects that appear are workers, which, as in the bees, are females not fully developed. By this time the queen has lost her power of making building-paper, her supply of saliva being exhausted, or rather diverted, and henceforth her duties are maternal, whilst the workers extend the nest from a little fairy ball, which might be hid in an egg-cup, to a great paper city. The loss of a queen amongst the wasps is not attended by the confusion which prevails when a similar calamity befals a community of bees. The workers continue to build; they even lay eggs, but the eggs laid by workers produce only male wasps or drones, and the swarm gradually dies away. Towards the close of summer the eggs laid by the queen produce drones and females; the latter do no work in constructing the nest, which they seldom leave except for short distances to bask in the sunshine. They are carefully fed by the workers with the best of the food brought home, and by the time that the wasp community finally breaks up they are in a condition resembling that of the bears before they take up winter quarters. Every available space within the bodies of these future mother wasps is stored with masses of fat for consumption during the long winter retreat. Whilst I read these notes they are quietly sleeping, tens of thousands of them, it is hard to say where; but in March or April next they will make their appearance and enter upon the duties of providing for a succeeding generation.

The drones may be known by their much larger antennæ. No male insect has a sting. Wasp paper is made of vegetable fibres, masticated by the powerful jaws or mandibles of the insect. These jaws open transversely, not longitudinally, as ours do. The researches of Dr. Landois have established the fact that the hum of insects is not produced by the

organs of flight. On the abdomen and on the thorax may be observed little apertures called spiracles; these are respiratory openings, and with them are connected the tracheæ, or air tubes. The proper instrument of voice answering to our vocal chords, or nearly so, is a little horny comb, which is placed across the spiracle, and vibrates like the tongue of a Jew's harp or accordion with the passing current of air. This explains what I have often heard from a bee, a shrill hum when the wings have been confined. The wings modify, but do not produce the hum.

For further information on the life history of the social wasps, I may refer to a beautiful work by the Rev. J. G. Wood, *Homes without Hands*, the best of all his numerous works; and to the still more recent, and, as indicating a patient, loving search after truth, more wondrous investigations accomplished by Sir John Lubbock, which appeared first in *Nature*, and afterwards in his work on "Insect Life."

SECOND ORDINARY MEETING.

ROYAL INSTITUTION, November 1st, 1875.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Ladies were present at this Meeting.

Messrs. W. H. Picton, Stevenson, Edmunds, Wilson, Prytherch, M.D., Doyle, and Lutschaunig were elected ordinary members.

Dr. CAMPBELL BROWN exhibited the magneto-electric machine, constructed on M. Gramme's principle, and illustrated its powers by several experiments.

Dr. CARTER exhibited a growing specimen of the Eucalyptus, and also a jalap plant, brought from the Botanic Gardens.

Dr. NEVINS exhibited a living specimen, recently born, of the snapping turtle.

The PRESIDENT read the following communication:—

I wish to communicate to the Society an episode, in the literary history of Liverpool, which may not be without its interest.

The publication of Mr. Curtis's mock heroic Latin poem of "Via Audax," giving a description of Bold Street, brought to my memory a *jeu d'esprit* of a similar character, published in 1820, in the *Kaleidoscope*, a local weekly literary journal, edited by Mr. Egerton Smith, of the *Liverpool Mercury*. It was entitled "Liverpool, an Heroic Poem, in Six Cantos," only four of which, however, saw the light.

The style and metre were those of Lord Byron's *Beppo* and *Don Juan*, mingling—

"The grave and gay, the lively and severe."

The poem exhibited decided talent, and attracted much attention, which was increased by the mystery and oddity by which its issue was surrounded. I will quote a verse or two at random, to illustrate the style, which will also show the enormous changes in the aspect and customs of the town which fifty-five years have brought about. He is describing Lord Street, which was then exceedingly narrow.

"Thy beauties, Lord Street, next attract the eye
(The Corporation should have made thee wider);
Along its well-trod pavement you may spy
Cart, carriage, gig, pedestrian and rider;
Here slumbering mud-beds 'lend their sullen dye,'
So if you wish to cross, take a good stride, or
Perhaps your foot by some curst chance may dart in,
And soil 'th' unrivalled jet' of Day and Martin.

"Here you may see, with slow and measured march,
A crowd of stiff-necked dandies sauntering,
From those who are *au fait* to stay and starch,
And chest and waist to due proportion bring,
To those who cannot tighten or enlarge,
Yet think themselves, good souls, the very thing;
In short, all nice gradations of a beau,
From humble 'would be' up to '*comme il faut.*'"

In this strain he perambulates the streets, taking note of whatever is noteworthy, occasionally interspersing his comic with a vein of sentiment, *e. g.*—

"Oh, woman, woman! loveliest, dearest, best,
Oh, born our hearts' wild sallies to command!
Whose smile can waken in the coldest breast
All that is tender, holy, pure, and bland.
Within thine arms we find a hallowed rest
From all the cold world's wrongs; thy gentle hand
Can press against the pallid brow of care,
And warm to life and love the tide that lingers there."

The author preserved his incognito notwithstanding Mr. Smith's earnest endeavours to penetrate the secret. He was evidently an Irishman, from the wild recklessness of his rhymes and the allusions in the text.

He entitled himself, Shaughnessy O'Shaughnessy, Esq., of the County of Tipperary.

After two cantos had appeared, a letter was received from Dermot O'Goster, Lieut. in the 88th Infantry, informing the editor that the lamented Mr. O'Shaughnessy, after partaking too freely at the Star and Garter, then a fashionable Hotel in Paradise Street, had walked into the Old Dock, and so terminated his poetical career. A communication was subsequently made that the ghost of the deceased poet had appeared in a whiskey barrel, and supplied the missing

cantos. This is a remarkable foreshadowing of the spiritualistic communications of more recent years. Two more cantos subsequently were brought to light, and the subject terminated, and was forgotten for more than half a century.

An accidental circumstance recently brought to my knowledge the name of the author, who was a young gentleman from Dublin, named Brooke, and at that period filled a situation in the office of Messrs. Brown, Shipley and Co. He returned to Dublin, but of his subsequent career my informant had no knowledge. Since then I have obtained further information. Mr. Brooke went into the Church. He was for many years Chaplain of the Mariners' Church at Kingstown. He is still living, and is Rector of a parish in the South of England.

This little history is interesting in itself, but it will be felt to be much more so when I state that Mr. Brooke is the great grandson of the celebrated Henry Brooke, the author of the tragedy of the *Earl of Essex*, and of the *Fool of Quality*, which, in its abridged form of *Henry, Earl of Moreland*, has, perhaps, been the most popular novel ever written. It was highly praised and recommended by John Wesley, and, after going through many editions, was brought out in 1872, with a preface by Canon Kingsley. In the *Dublin University Magazine*, for 1842, will be found a memoir of Henry Brooke, by his descendant Richard, the poet of Liverpool. Mr. Brooke is also the father of a distinguished son, the Rev. Stopford Brooke, one of the Queen's Chaplains, a well-known author, and a distinguished member of the Broad Church School of English Theology. Several other members of the family are also known in the literary world, authorship having been indigenous in the family for several generations.

I thought a short notice of these incidents might not be unacceptable to the Literary and Philosophical Society.

Dr. CAMPBELL BROWN then read a Paper on "Electricity compared with Heat as a source of motive power."*

THIRD ORDINARY MEETING.

ROYAL INSTITUTION, November 15th, 1875.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Ladies were present at this meeting.

Messrs. W. Bellis and E. L. Fleming, F.C.S., were elected ordinary members.

The Rev. H. H. HIGGINS exhibited a copy of the *Primer*, published in the reign of Henry VIII., and an original copy of the *Book of Common Prayer*, published by Edward VI., also an original copy of the *Directory*, published by authority of Parliament in the reign of Charles I.

The PRESIDENT exhibited a collection of the Fine Art volumes recently added to the Free Library. A lengthened conversation followed on the comparative merits of English and French typography.

Mr. G. H. MORTON, F.G.S., exhibited a series of fossil corals from the carboniferous limestone of North Wales. The specimens were all remarkably perfect, and some of the species are of very rare occurrence. He also showed some photographs, indicating the position in the strata where the specimens were found in several localities, but principally in the neighbourhood of Llangollen.

Mr. R. C. JOHNSON, F.R.A.S., gave an account of the November meteors, and showed their path in the sky by a diagram on the blackboard.

* See page 93.

Mr. T. J. Moore exhibited the recently-mounted composite skeleton of the Elephant-footed Moa, *Dinornis elephantopus*, Owen, the bones of which were received from Capt. Hutton, Director of the Otago Museum, Dunedin, through the kind offices of Dr. Millen Coughtrey, Corresponding Member, early in the year, and a portion exhibited in their unmounted state, Nov. 16th, 1874. (See *Proceedings*, 1874–5, vol. xxix, p. xlvi.)

FOURTH ORDINARY MEETING.

Royal Institution, November 29th, 1875.

J. A. PICTON, F.S.A., President, in the Chair.

Ladies were present at the Meeting.

Messrs. D. E. Yates, J. H. Tetley, and W. Gardner were elected ordinary members.

Dr. Collingwood, one of the Honorary Members, and formerly Honorary Secretary to the Society, attended the Meeting.

Mr. Lutschaunig exhibited a small collection of aërolites and meteoric stones.

Mr. C. J. English exhibited a horizontal section of one of the piles found among the remains of the Lake Dwellings near Rolle, on Lake Leman.

Mr. E. R. Russell then read a Paper on "The True Macbeth."*

* See page 41.

FIFTH ORDINARY MEETING.

ROYAL INSTITUTION, December 13th, 1875.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Messrs. E. Harpin, Peter Cowell, Jas. Barnes, and Jos. B. Hutchinson, M.R.C.S., were unanimously elected ordinary members.

The PRESIDENT read a brief communication on "The House of Stanley, and the Origin of its Legend of the Eagle and Child."*

The Honorary Librarian read a Paper by Dr. INMAN, "On a Means employed for Removing and Erecting Menhirs."†

SIXTH ORDINARY MEETING.

ROYAL INSTITUTION, January 10th, 1876.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Messrs. Alexander Reid and Geo. R. Rogerson, F.R.A.S., F.R.G.S., were duly elected ordinary members.

Mr. ALFRED MORGAN, Honorary Librarian, read "A Few Notes on the Khāsi Hill Tribes, and the Geology of the Shillong Plateau."‡

Mr. JOSEPH BOULT read a Paper called "Gleanings from the Early History of Liverpool."§

* See page 283. † See page 103. ‡ See page 115. § See page 153.

SEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, January 24th, 1876.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Ladies were invited to the Meeting.

Messrs. Lewis Hughes and Robinson Souttar were duly elected ordinary members.

Mr. CHANTRELL invited the co-operation of the Society in assisting the proposed exhibition of English and Foreign Scientific Apparatus to be held at the South Kensington Museum in the ensuing summer.

Mr. R. C. JOHNSON, F.R.A.S., exhibited the new instrument called the Radiometer. This beautiful apparatus was invented by Mr. William Crookes, F.R.S., about two years ago, when engaged on researches into the laws of radiation of light. The instrument now exhibited was constructed by Herr Geissler, the well-known maker of vacuum tubes, and was obtained from Mr. Browning, of London. It consists of four small vanes, attached by short axes to a central cup, which is delicately suspended on a steel point. The vanes are metallic, polished on one side, and covered with a dead-black substance on the other, and the whole is enclosed within a glass globe, from which almost all the air has been exhausted by means of the Sprengel pump, the exhaustion being carried on for twelve to eighteen hours, and in some cases for four days. When the radiometer is subjected to the action of light the vanes immediately rotate in one direction—*i. e.*, the blackened vane moves from the light as if it were repelled. Sunlight or the electric light causes such rapid rotation that the vanes cannot be distinguished, while

the light of a taper will cause it to rotate two or three times in a minute. Its behaviour after extremely rapid rotation is very curious. When the light is withdrawn it soon stops, and then turns round for a few seconds in the contrary direction, finally resuming a motion in the normal direction, at a speed according to the amount of light in which it is placed. The action of this instrument is totally inexplicable upon any known laws of radiation, and, in spite of its having been subjected to almost every conceivable mode of experiment, it is yet impossible to decide the nature of the laws which govern it. Mr. Johnson remarked that physicists would wait with some curiosity the confirmation of the theory of light which will doubtless accrue from a further investigation.

Dr. CAMPBELL BROWN confessed the remarkable nature of the instrument, which appeared to realise a conversion of light into force; and remarks on the subject were made by the President and other gentlemen.

Mr. ALFRED MORGAN called attention to an article on Double Stars, in the last number of the *Quarterly Journal of Science*, and gave some details therefrom.

Mr. T. J. MOORE exhibited the skeletons of two species of Apteryx (*A. Mantelli* and *A. Oweni*), mounted by Mr. E. Gerrard, jun., and recently added to the Free Public Museum.

Mr. MOORE also exhibited, from the Derby collection in the same Museum, the first specimen of Apteryx ever brought to Europe, being the type specimen of *Apteryx Australis* of Dr. Shaw; and also the type specimen of Mantell's Apteryx, *A. Mantelli* of Bartlett, from the same collection; together with two recently acquired specimens, adult and young, of Owen's Apteryx, *A. Oweni* of Gould.

Dr. RICKARD then read an interesting Paper on "The Gems of Statuary, Ancient and Modern," illustrated with remarkable power and beauty by photographs under a magic

lantern. The exhibition of various works of Phidias, Praxiteles, Michael Angelo, Canova, Chantrey, M'Dowell, Foley, &c., was greatly applauded, and a discussion on the comparative merit of ancient and modern art, and other points, was conducted by the Rev. E. M. Geldart, Mr. H. S. Samuel, and the President, who also conveyed to Dr. Rickard the thanks of the Society.

EIGHTH ORDINARY MEETING.

ROYAL INSTITUTION, February 7th, 1876.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Ladies were present at the Meeting.

Mr. T. J. MOORE introduced Surgeon-Major Edward Nicholson, of the Army Medical Department, lately returned from India, and the author of a treatise on Ophiology, of great value to all interested in the snakes of India.*

The PRESIDENT congratulated Mr. R. C. Johnson, on behalf of the Society, on his election as an F.R.A.S., and referred to his numerous astronomical contributions to the Society.

Mr. J. NEWBY HETHERINGTON then read a Paper on "Repetition and Reduplication in Language."†

* *Indian Snakes. An Elementary Treatise on Ophiology, with a Descriptive Catalogue of the Snakes found in India and the adjoining Countries.* By Edward Nicholson, Surgeon, Army Medical Department. Second Edition. Madras, Higginbotham and Co. 1874. 1 vol. 8vo., pp. 186, plates i.–xx.

† See page 129.

NINTH ORDINARY MEETING.

ROYAL INSTITUTION, February 21st, 1876.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Ladies were present at this Meeting.

The PRESIDENT exhibited a fac-simile of the Ardagh Chalice, presented to the Free Museum by Mr. Henry Yates Thompson, of Thingwall Hall. The original was found in a rath, or ancient hill fortress, near the village of Ardagh, in Limerick, September, 1868.

A discussion then ensued on Professor Crookes's experiments on a method of weighing a ray of light, and on his lecture given at the Royal Institution in London, on the "Mechanical Power of Light."

Mr. ALFRED MORGAN communicated the following note on "The Relation of Flowers to Insects":—

Sir John Lubbock, in his paper on "The Relation of English Wild Flowers to Insects,"* details some experiments which he made in order to ascertain whether bees are capable of distinguishing colours, and which seem to prove that they possess the faculty of doing so. He placed some honey on a slip of glass, and put the glass on a piece of blue paper, and when the bee had made several journeys, and thus become accustomed to the blue colour, he placed some honey in the same manner on orange paper; then, during one of the absences of the bee, Sir John transposed the two colours, leaving the honey in the same place as before; the bee returned as usual to the place where she had been accustomed

* *British Flowers considered in Relation to Insects*, and also *Proceedings of Royal Institution of Great Britain*, vol. vii., p. 351.

to find the honey, but though it was still there she did not alight, but paused for a moment, and then darted straight to the blue paper. No one, he says, who saw the bee at that moment could doubt that the insect possessed the power of discriminating between the two colours.

In another experiment, after having accustomed the bee to come to honey on blue paper, he ranged other supplies of honey on paper of other colours, yellow, orange, green, red, black, and white; then he continually transposed the coloured papers, leaving the honey in the same spot, but the bee always flew to the blue paper wherever it might be.

Every student of nature knows as the result of Sprengel's, Darwin's, and Lubbock's researches, that there is an intimate relation existing between flowers and insects; bees, butterflies, &c., derive the main part of their nourishment from flowers, and the flowers themselves owe their existence to the functions performed by insects. Sprengel was the first who pointed out the service rendered by insects in the transference of the pollen from stamen to pistil, but Darwin was the first to perceive that the importance of this consisted not merely in the transference of the pollen from one organ to another, but from one plant to another, and that the colour, scent, and form of flowers is due to the insect visitors. Thus the lines and fronds which constitute the exquisite marking of flowers have reference to the position of the honey, and these "honey guides" are absent in night flowers, where, of course, they would be useless, because invisible. Night flowers are usually pale; for instance, *Lychnis vespertina* is white, while *L. diurna* is red.

Many flowers are fertilised by means of the wind simply, which distributes the pollen from one flower to another, or from pistil to stamen of the same flower; and it is remarkable that all wind-fertilised flowers have no colour, no scent, and no honey. When we consider that the largest and

most beautiful flowers owe the most to insect agency, we have an *à priori* reason for supposing that insects have a perception of colour, which Sir John Lubbock's experiments confirm. Recent researches show that insects, and especially bees, have an importance in relation to floral development that was, before the publication of Sprengel's observations, quite unsuspected. Sir John Lubbock thus concludes his Paper:—"To insects we owe the beauties of our gardens and the sweetness of our fields; to them flowers are indebted for their scent and colour, nay, for their very existence in their present form; not only have the brilliant colours, the sweet scent, and the honey of flowers been gradually developed by the unconscious agency of insects, but the very arrangement of the colours, the circular bands and radiating lines, the form, size, and position of the petals, the arrangement of the stamens and pistil, all have reference to the visits of insects, and are disposed in such a manner as to ensure the great object which these visits are destined to effect. For it is obvious that any blossom differing from the form and size best adapted to secure the due transference of the pollen would be less likely to be fertilised than others; while, on the other hand, those which were rich in honey, which were the sweetest and the most conspicuous, would most attract the attention and secure the visits of insects; and thus, just as our gardeners, by selecting seed from the most beautiful varieties, have done so much to adorn our gardens, so have insects, by fertilising the largest and the most beautiful flowers, unconsciously, but not the less effectually, contributed to the beauty of our woods and fields."

Mr. THOMAS WARD then read a Paper on "Salt, and its Export from the Ports of the Mersey." *

* See page 183.

TENTH ORDINARY MEETING.

ROYAL INSTITUTION, March 6th, 1876.

JOHN J. DRYSDALE, M.D., M.R.C.S., VICE-PRESIDENT, in the Chair.

Mr. J. L. PALMER, Staff-Surgeon, Royal Navy, read a communication giving some additional information which he had recently received concerning the sculptured figures in Easter Island.*

Mr. ALFRED LUTSCHAUNIG then read a Paper on "Method in Creation."

ELEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, March 20th, 1876.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Ladies were present at this Meeting.

Mr. G. F. Chantrell was unanimously elected an ordinary member.

The Rev. THOMAS P. KIRKMAN contributed a Paper on "The Janal 14-edra." †

Mr. JOSIAH MARPLES described a new method of reproducing engravings and altering their size by an adaptation of the electro-type process.

Mr. BARON LOUIS BENAS then read a Paper on "The Men who have Influenced Modern German Thought." ‡

* See page 255. † See page 271. ‡ See page 285.

TWELFTH ORDINARY MEETING.

ROYAL INSTITUTION, April 3rd, 1876.

JOHN BIRKBECK NEVINS, M.D., EX-PRESIDENT, in the Chair.

Ladies were present at the Meeting.

Mr. ALFRED LUTSCHAUNIG exhibited a specimen of Apatite or Phosphorite, and made some remarks thereon.

Lieutenant CAMERON, R.N., who had arrived in Liverpool the previous day, on his return from his perilous journey across the Continent of Africa, was introduced to the Meeting by Mr. A. Morgan, and was received with acclamations.

Mr. W. T. BLACK, Surgeon-Major, then read a Paper on "The Partridges of South Africa, and Partridge Shooting in the Great Winterberg District, Cape of Good Hope,"* and was followed by Dr. NICHOLSON, who read a Paper on "Indian Snakes."†

Mr. HIGGIN called attention to two specimens of the genus *Luffaria*, brought to the Free Museum by Capt. J. A. Perry, Associate of the Society, from Port-au-Prince, the apertures of the tubes of which retain the "duplicatures of dermal sarcode, which in a ring-like form surround the openings, and perform the sphinctral diaphragmatic office common to vents generally," as in the specimen in the British Museum, obtained fresh by Admiral Spratt, in the East Mediterranean, and preserved in spirit. (*Annals and Mag. Nat. Hist.*, September, 1875, ser. 4, vol. xvi., p. 227.)

Capt. PERRY, who was present at the meeting, exhibited the head, neck, and pouch of a Brown Pelican (*Pelecanus fuscus*,

* See page 289. † See page 211.

Linnæus), and stated that he had found three different kinds of parasites infesting this bird—one peculiar to the pouch, a *Trinotion*, the males of which are remarkable for a stout curved obtuse spine, rugose at the summit, arising from the inner inferior angle of each tibia, having of course a sexual signification. The females are unarmed. It is believed to be new to science, and it is suggested that it should receive the name of *Trinotion bursæ-pelecani*. This species is, as has been stated, limited to the pouch, none having been found on the body, though a minute search, on the occasion of a second bird having been procured, was instituted, with the view of determining any doubts as to its peculiar habitat. One or two only, obviously escapes, having been taken on the head and beak. Two other species, however, belonging to the feather-eating genera, *Colpocephalon* and *Lipeurus*, were procured from the body. Both are handsome species. Neither has yet been identified, but will probably be found common to many marine birds. Specimens of the above parasites, beautifully mounted as microscopic objects, were presented by Capt. Perry for the cabinet of the Museum.

THIRTEENTH ORDINARY MEETING.

ROYAL INSTITUTION, April 17th, 1876.

J. A. PICTON, F.S.A., PRESIDENT, in the Chair.

Ladies were present at this Meeting.

Mr. ARTHUR NEVINS, on the introduction of Dr. Nevins, read a communication explaining a method of correcting the rate of a marine chronometer for change of temperature, according to Hartnup's laws. He also contributed a set of

Tables for facilitating the calculations of the same corrections.*

The PRESIDENT exhibited a series of specimens of beautifully variegated marbles, presented to the Free Museum by the Royal Academy of Fine Arts, Carrara, through the kind offices of the Director, Ferdinando Pelliccia, and of Signor Giovanni Fontana. They are from a rich collection presented to the Academy by Signor G. B. del Monte, from the ancient quarries recently discovered by him in Numidia, which were worked in the time of the Romans, and of which all traces had been lost.

Mr. A. MORGAN exhibited a specimen of Flexible Sandstone from the Free Public Museum;† and Mr. J. L. PALMER, Staff-Surgeon, R.N., a Cola nut from the West Coast of Africa. The latter is used by the natives to prevent sleepiness. It is also used as a tonic, and has the power of making bad water sweet.

Mr. T. J. MOORE exhibited the following recent additions to the Free Public Museum:—

1. Two specimens of the Himalayan Ibex (*Capra Sibirica*), and two specimens of the Warryato (*Hemitragus hylocrius*), or "Neilgherry Ibex" of sportsmen, but really a species of wild goat. These were shot by Mr. St. George Littledale, and presented, with various specimens of birds, etc., collected by him during a recent tour in India, China, Japan, and the Rocky Mountains. Examples of the species above-named, especially of the Warryato, are of great rarity in collections. The task of properly preparing and preserving skins of such large game, by no means inconsiderable, is a heavy tax after a hard day's stalking, and hence it is rarely undertaken. The labour and expense of transport are also important items. These specimens had been prepared with great care, and in consequence had been very success-

* See page 227. † For remarks upon it see page 223.

fully mounted by Mr. Henry Reynolds, taxidermist to the Museum.

Mr. Littledale kindly supplied the following notes respecting the Warryato:—

"The 'Neilgherry Ibex,' or Wild Goat, is confined almost exclusively to two ranges of hills, rising to about seven thousand feet elevation, the Koondahs (the western hills of the Neilgherries), and the Annamullies, about twenty miles distant, and separated by the Wynaad Jungle. These animals are not nearly as numerous as they were formerly. They are a favourite food of the tiger; and a *saddle-back* (an old male with a white mark on his back) is considered a great trophy by sportsmen, so that they have no peace. In the fine weather they live on the western cliffs of the Koondahs, but are driven on to the eastern slopes during the monsoon. They go in large herds; I have counted over fifty in one. The old males of the herd perch themselves on rocks, and stand motionless for ten minutes together on the look-out, and then suddenly they move and look in another direction. It is utterly impossible to get underneath them on the cliff without them seeing; they can only be approached from above. When a shot is fired they all collect together, and then make off under the guidance of some old male. Herds are occasionally met with in the jungle, when they are migrating from one set of hills to the other. An old sportsman of the Neilgherries estimated the total number remaining to be between three and four hundred."

2. The following specimens, presented by Mr. Hugh Heywood Jones, collected by him during a shooting excursion in Thibet and the North Western Himalayas, in 1875:—

Head and horns of Hodgson's Antelope, or Chiru, *Pantholops Hodgsonii*, from Chang Chenmo, Thibet, at an elevation of about seventeen thousand feet. Mr. Jones states that

the animals he fell in with were so infested by bots that their skins would have been unfit for stuffing. Choughs were continually observed searching for the bots on the backs of the Chiru.

Head and horns of the Oorial, or Punjâb Wild Sheep, *Ovis cycloceros*, from the Salt Range.

Head and horns of the Burrhel, or Blue Wild Sheep, *Ovis nahura*, from Ladakh; and a young skull of *Ovis Vignei*.

A large Flying Squirrel, *Pteromys inornatus*, Kashmir. The Shikarries say that it lives in its hole in winter on food stored in summer, and that it is often killed in mid-winter.

Specimens, adult and young, of the Thibet Marmot, *Arctomys bobac*, from the Gya Valley, Ladakh; one of the largest species of Marmots known.

Specimens of *Lagomys*, Voles, Musk Shrew, skulls of two species of Hares, etc., were also included in the collection, which, when mounted, will form an important addition to the Museum.

3. The skull and bones of a *Susu*, or fresh-water Porpoise (*Platanista Indi?*), from Mooltan, specially procured for the Museum by Lieut.-Col. C. A. McMahon. The Susus are peculiar to the fresh-waters of India, those from the Ganges and its tributaries being distinct from those of the Indus system. They are of small size, the beak remarkably prolonged and slender, with numerous sharp, curved teeth in each jaw, the shortest being at the gape, and the longest at the snout. Both skull and skeleton present peculiar modifications of form. Though often seen in certain localities, they are only caught with extreme difficulty, and are rarely taken by fishermen.

4. A rare Siluroid Fish, of the genus *Plecostomus*, from Uruguay, called by the natives *Viega del Aqua*, or Old Woman of the Water, presented by Mr. W. P. Steer,

Estançia del Ombu, Porongos. Among the many remarkable forms of Siluroid fishes, this genus is one of the most singular. The head forms one immense armour-plate; the scales are of similar character, with the addition of a keel or boss, covered with spines, on each; and the first ray of the pectoral and ventral fins is a formidable spine, that of the pectorals being profusely covered with rough recurved smaller spines of considerable length. Some dozen species are described in ichthyological works, but few are to be seen in collections. They are peculiar to tropical America.

5. Various weapons and implements from West Africa, collected and presented by Mr. R. B. N. Walker, F.R.G.S., Corresponding Member of the Society. The most remarkable were a singularly-shaped Tomahawk, or Throwing Knife, from the Osyeba, or Ba-Fanh, somewhat similar to one figured by Du Chaillu, in his *Equatorial Africa*, 1861, p. 79; and a primitive form of Bellows, from Batanga, which the natives use in the working of iron.

6. Mr. Moore stated that a Cetacean of considerable size having been reported in the papers to have been stranded at West Kirby, on the Cheshire side of the Dee, on the 22nd of March last, he proceeded to the spot, but too late to see more than mutilated portions of the creature, which was cut up, and in process of boiling down for the oil. The head had been divided into several portions. The upper and under jaws were cut away, but not otherwise much injured. The teeth were eleven on each side of the lower jaw, and twelve on each side of the upper, the longest projecting an inch and a half beyond the gum. The tail and flippers, both pectoral and dorsal, had been severed from the carcase, but were otherwise intact. Sketches of these were made, and the two pectoral flippers secured for the Museum, where they will be skeletonised. The specimen was a male, and was stated to have been twenty-five feet long.

The total length could not be verified, but the following dimensions were accurately taken :—

	Feet.	Inches.
Tail: width from tip to tip	6	6
Dorsal fluke: width at base	2	2
" height	3	7
Pectoral fins: greatest width	2	5
" length	3	6

This creature would thus appear to have been a specimen of the Grampus or Killer, probably *Orca gladiator*, whose habitat is the North Sea, and of which specimens have been taken as far south as the Thames, but which occurs much more frequently off the Shetland and Orkney Islands. It is altogether new to our local fauna, and is therefore deserving of special notice, no instance being recorded of its previous occurrence within the Liverpool district. The fierceness and voracity of the Killer are extreme, and it is a great enemy to porpoises and seals. It is remarkable that this specimen, in its death agony, threw up a quantity of feathers of sea-fowl! as I was informed by a credible eye-witness, Mr. Peter Lunt, of West Kirby, the purchaser of the carcase, to whom I am indebted for permission to examine the remains. Two or three feathers were still sticking to the sides of the gullet when I made my inspection.

Mr. RICHMOND LEIGH, F.R.C.S., then read a Paper on "Vegetation and Climate."*

* See page 279

PAPERS READ DURING SESSION.

ADDRESS.

By J. A. PICTON, F.S.A., President.

First of all I have to thank you for the honour you have done me in my election for a second term President of a Society which has for so many years stood in the van of literary and scientific progress in this locality. It is an honour which was unsought, and, if I may venture to say so without being misunderstood, undesired. I have already enjoyed the honour, and have arrived at a period of life when the energies begin to flag, and when, for reasons both personal and public, it is not desirable to take a very prominent position.

In early life, when the mind first begins to feel its powers, and the wide expanse of knowledge stands ready for occupation, every acquisition is hailed as a triumph and conquest. Our attention is taken up by the positive additions to our attainments; but as we advance in life, we become gradually aware of the extent of our ignorance—of the vast proportion which the things we do not know bear to those about which we have any real information. If this experience does not teach modesty and self-distrust, the lessons of life have been learned in vain.

It is therefore with some hesitation that I consent to occupy a position which might be better filled by a younger and more vigorous selection, but, having accepted the office, I will do the best in my power to fulfil its duties.

Within the last few years it has become the rule for your President, at the commencement of each Session, to give an

Introductory or Inaugural Address. I think the rule a good one. It is a stimulus to the President to prove himself worthy of his office, and it naturally gives a wholesome impulse to the members to follow his example.

In framing these addresses, there is some difficulty in hitting the exact point. Vague declamations on the objects and advantages of science and literature, are apt to become stale and unprofitable; whilst the selection of any technical subject, on which to enlarge, resembles too much the ordinary Papers of the Session.

My immediate predecessor has wisely avoided both these extremes in the selection of his subjects; and in his addresses on prehistoric civilisation, and the vicissitudes to which human progress has been liable, has afforded a model for the general character of such compositions, which his successors may study with advantage.

I think I cannot do better than follow the course of ideas which our late President so ably initiated. He has traced out the symptoms of early civilisation in countries and periods very remote from our own, and speculated on the changes, retrogressive as well as progressive, which the human race has undergone, and of which evidences are visible to those who will seek for them. I propose to transfer the inquiry from the past to the future. I take the present state of things as we find it, by whatsoever means brought about, and I ask the question—In what direction, and towards what ends, is the current of human affairs flowing? Though the inquiry is too subtle to allow us to arrive at any very definite conclusions, and it would be presumptuous to dogmatise on a subject of such vast extent, yet there lie scattered about us, loosely and vaguely it may be, on every side, indications, more or less clear, of the development of ideas, the breaking up and re-formation of institutions, the necessary effects of material progress on the habits

of mankind, both personal and national, and the inter-penetration of thought necessarily resulting from the unlimited intercourse of modern times, which may enable us, with more or less accuracy, to determine the bearings of the current along which we are drifting.

My subject this evening, therefore, will be—

THE TENDENCIES AND THE FUTURE OF MODERN CIVILISATION.

It is necessary, in the first instance, to form a clear notion of what we understand by the employment of this term. Its ideal is not fulfilled by material prosperity; by extensive empire; by refinement of taste; by the rigorous and impartial administration of law; by the heights of philosophical thought to which a favoured few may soar; nor even by the existence of religious principles derived from the purest source. Some of these may be present, and carried to a high degree of perfection, and yet the highest style of civilisation may be far from attainment.*

Our late President, in his Address of October, 1872, thus sets forth his view: "Clearly the word civilisation refers to man himself, and not either to his works or his surroundings. It is his intellectual and moral being that we speak of, and we call him civilised or not according to the culture of his mind and the character of his behaviour."

M. Guizot thus explains his view of the subject: "Il m'a

* "Une grande amelioration sociale, un grand progrés du bien-être matériel, se manifestent-ils chez un peuple sans être accompagnés d'un beau développement intellectuel, d'un progrés analogue dans les esprits; l'amelioration sociale semble precaire, inexplicable, presque illegitime."—Guizot, *Histoire de la Civilisation en France*, i. 7.

"A great degree of social improvement, a great advance in material prosperity, if they manifest themselves amongst a people without being accompanied by a corresponding mental progress, the social improvement appears precarious, unaccountable, and scarcely legitimate."

paru que, de l'avis general, la civilisation consistait essentiellement dans deux faits; le developpement de l'état social, et celui de l'état intellectuel; le developpement de la condition extérieure et générale, et celui de la nature intérieure et personelle de l'homme; en un mot, le perfectionnement de la societé et de l'humanité."*

"It appears to me that by general consent civilisation is contained in two facts, the development of the social and intellectual condition—that of the exterior and general relations, and of the interior and personal nature of man; in one word, the perfecting of society and humanity."

These definitions are clear and intelligible, but to express my own idea it is necessary to add a word or two. Civilisation is to the body politic, what culture is to the individual, which consists, I venture to think, in the due and proportionate development of all his faculties, physical, intellectual, emotional and moral; and in proportion as any of these are neglected, the culture or civilisation will be imperfect, abnormal, and incomplete.

Before proceeding to speculate on the future, it is necessary to take a brief glance at the past. The course of the world's history has not been spasmodic or paroxysmal, but connected by cause and effect from a period far beyond the reach of human history or tradition. In times far remote from the present, civilisation existed, in certain relations of a very high character, the influence of which is felt at the present day, and will probably be perpetuated to the end of time. The course of human thought and progress has been so far shaped and modified by what has gone before, that the present and future can only be very imperfectly understood without a proper appreciation of the past. So much has been written about ancient civilisation, that it will only now be necessary to take a rapid survey of its most salient features.

* *Histoire de la Civ.*, i. 6.

Ancient civilisation was essentially Greek in its origin. Here I cannot help quoting from a recent lecture by Sir Henry Maine, a passage which most eloquently and truly describes the relation of Greece to the progress of the world. He says, "Whatever be the nature and value of that bundle of influences which we call 'Progress' . . . there was only one society in which it was endemic, and, putting that aside, no race or nationality left entirely to itself appears to have developed any very great intellectual result, except, perhaps, poetry. Not one of those intellectual excellencies which we regard as characteristic of the great progressiveness of the world — not the law of the Romans; not the philosophy and sagacity of the Germans; not the luminous order of the French; not the political aptitude of the English; not that insight into physical nature to which all races have contributed — would apparently have come into existence if these races had been left to themselves. To one small people, covering in the original seat no more than a handful of territory, it was given to create the principle of progress, of movement upwards, and not backwards and downwards — of destruction tending to construction. That people was the Greek. Except the blind forces of nature, nothing moves in this world which is not Greek in its origin. A ferment spreading from that source has vitalised all the great progressive races of mankind, penetrating from one to another, and producing results accordant with its hidden and latent genius, and results of course, often far greater than exhibited in Greece itself."

Now, Greek civilisation was essentially æsthetic in its character, and gave a similar tone to the culture of the ancient world. All the surroundings of Greek life were marked by the most exquisite taste. Their architecture displays a refinement of form and proportion elsewhere sought in vain. Their sculpture, in its dignified repose and

quiet beauty, puts to shame the noblest works of all succeeding times. Whoever has visited the Museo Borbonico at Naples will bear witness to the elegance of form impressed even upon the humblest instruments of daily household life. Their ceramic manufacture was carried to the highest pitch of perfection. In the extremely difficult and delicate process of gem engraving, modern efforts, with all the appliances of optical and mechanical science, toil after the ancients in vain. The poets, historians, and dramatists of Greece are acknowledged by all subsequent ages to be the purest models of style which the world has ever seen.

To a lesser extent, the same æsthetic development derived from this source pervaded the Roman empire, and has stamped upon ancient culture a character all its own.

In purely intellectual philosophy, the ancient schools, though not possessing the same pre-eminence, sounded the depths of human nature, and soared as high in mental speculation as any of the moderns have been able to reach. The brilliant galaxy of Athenian philosophers, who, in the fifth century before our era, rendered the groves and porticoes of Athens for ever memorable, left no line of purely mental inquiry unexplored.

Closely connected with mental science stands ethical philosophy, which the ancients prosecuted with a zeal and earnestness worthy of all commendation. The stoical theory of ethics established by Zeno, and subsequently developed by Epictetus, Seneca, Cicero, and Marcus Aurelius, was in many respects one of the noblest achievements of unaided human wisdom. The eloquent historian of *European Morals* thus characterises the principles of stoicism: "This school of philosophy furnishes the most perfect of all historical examples of the power which the higher motives can exercise over the mind. The coarser forms of self-interest were in stoicism absolutely condemned. It was one of the first prin-

ciples of these philosophers that all things that are not in our power should be esteemed indifferent; that the object of all mental discipline should be to withdraw the mind from all the gifts of fortune; and that prudence must in consequence be altogether excluded from the motives of virtue."* "Pleasure," they argued, "is the companion, not the guide, of our course." "We do not love virtue because it gives us pleasure, but it gives us pleasure because we love it." Man's end, according to these teachers, is not to find peace either in life or in death. It is to do his duty, and to tell the truth. †

In addition to mental and moral philosophy, jurisprudence and law occupied a high place in ancient civilisation, especially under the Roman empire. The jurisprudence and civil rights at the present day, throughout the greater part of Christendom, are based upon the Roman laws, still appealed to for the principles therein laid down, which have never been superseded.

These are a few of the points at which the civilisation of the ancient world reached a high standard; but it was accompanied by many shortcomings. Whatever might be its merits, they were enjoyed by a very small portion of the community. In Rome, a large proportion of the people, and in Greece, a still larger, were slaves; and though it is true that of these some were educated, and have even immortalised their names, the great majority were in a state of brutal ignorance. Even amongst the members of the body politic, education and refinement penetrated to a very limited extent. According to the description of Gibbon— "From the stately palaces (of the baths) issued a swarm of dirty and ragged plebeians, without shoes and without a mantle, who loitered away whole days in the street or Forum, to hear news and to hold disputes; who dissipated in extra-

* Lecky, *Hist. Europ. Morals*, i. 190. † *Ibid*, i. 197.

vagant gaming the miserable pittance of their wives and children; and spent the hours of the night in obscure taverns and brothels, in the indulgence of gross and vulgar sensuality."

Again, the area of ancient civilisation was extremely limited in its extent. Before Greece and Rome became eminent, the primitive cultivation of Assyria and Egypt had become effete, and down to the latest period a narrow fringe round the Mediterranean Sea contained all that the world possessed of literature, art, science, and philosophy.

The material progress of the ancient world was limited and checked by their comparative unacquaintance with the powers of nature. The expansive and explosive forces latent around us, which have multiplied a thousand fold the means at man's disposal, were utterly unknown. Machinery, in any proper sense of the term, did not exist. Even at the most refined period of the classical ages, the corn had to be laboriously ground by hand for the daily supply of bread. Education was necessarily limited by the expense and scarcity of the manuscripts which supplied the place of modern books. Although the exact sciences were carried to a high pitch of cultivation by the ancient philosophers, yet the study of the higher mathematics was limited by the want of a suitable method of calculation, and by the cumbrous mode of giving expression to numerical problems.

Natural philosophy was necessarily cramped and dwarfed in its development by the mistaken methods adopted of arriving at the truth. Experimental enquiry, the great source of modern successful progress in every branch of knowledge, was almost unknown. The deductive and synthetical system, which reasoned from an assumed cause to what it was supposed ought to be the result, filled the place of the modern inductive principle of analysis, which first observes, then generalises, and traces the line of sequences

to their ultimate origin. Hence the limited knowledge of physiology and of the human frame, and the adoption and rejection of successive hypotheses to account for every phenomenon in nature.

The ancient systems of administration and government, amongst much which was admirable, were deficient in the essential elements of permanence. The idea of the unity of the body politic, of equal rights to every member, of the interest of each being the interest of all, seems never to have been reached. Hence the history of Greece and Rome is the record of a perpetual struggle for ascendancy on the one hand, and for emancipation and recognition on the other. The elements of society never thoroughly coalesced and amalgamated into an harmonious whole. The result was a chaotic confusion and looseness of texture, so to speak, which rendered the whole fabric liable to dissolution on the application of any external force.

One of the most serious defects in ancient civilisation was on the emotional and sympathetic side. The natural instincts of humanity, so far as related to the family affections, no doubt were in exercise, though even these were on occasion sternly repressed by the influence of a false philosophy; but that wider scope of sympathy developed in modern times, which extends a helping hand to every form of human suffering, was altogether unknown.

"In spite of the casual efforts of some of the better emperors in this direction, no permanent institution for the relief and gratuitous maintenance of the suffering, the refuge of the infirm and aged, or the reclaiming of the fallen—nothing corresponding to our hospitals, almshouses and asylums—existed amid the civilisation of the Roman empire. Antique heathenism had neither the idea nor the word to express charity in anything like our acceptation of its profound meanings."*

* *Saturday Review*, June 19, 1875.

"Friendship rather than love, hospitality rather than charity, magnanimity rather than tenderness, clemency rather than sympathy, are the characteristics of ancient goodness."*

Stoicism, which was the noblest impersonation of antique virtue, declared war against the whole emotional side of our being, and thus led to the extirpation of the feelings which nature intended as the chief springs of benevolence. Men who refused to recognise pain and sickness as evils, were scarcely likely to be very eager to relieve them in others.

But the greatest blot on the civilisation of old was the want of a high and true moral standard. In the earlier and purer days of Greece and Rome, patriotism was accounted the highest virtue, and many noble examples exist of self-devotion on behalf of their country. To this succeeded, at least amongst the leading classes a deep sense of honour—of shame at doing anything mean or unworthy. This was the ideal of the virtuous man, as drawn by Horace:

"Justum et tenacem propositi virum
Non civium ardor prava jubentium
Non vultus instantis tyranni
Mente quatit solidâ, neque Auster
Dux inquieti turbidus Adriæ
Nec fulminantis magna Jovis manus;
Si fractus illabatur orbis
Impavidum ferient ruinæ.†

* Lecky, *Hist. Europ. Morals*, i. 200.

† Horace, *Od.* iii. 3-1.

The man in conscious virtue bold,
Who dares his secret purpose hold,
Unshaken hears the crowd's tumultuous cries,
And the impetuous tyrant's angry brow defies.
Let the wild winds that rule the seas,
Tempestuous all their horrors raise;
Let Jove's dread arm with thunders rend the spheres,
Beneath the crush of worlds undaunted he appears."

The best examples of virtue left us by the ancients are built upon a lofty idea of the dignity of human nature, and thus exhibit only a kind of majestic egotism, which frequently fell in practice far short of its professions. Vices which are now stigmatised as degradation of the lowest kind, were unblushingly indulged in without rebuke, even by philosophers of high pretensions. Religion and morality had no connection with each other. The popular mythology, illustrated by the poets, described the gods as indulging in unbridled sensuality, deception, cruelty and falsehood, and in many of the religious celebrations, orgies of the most detestable character were considered an essential part of the services. The picture of Roman society drawn by St. Paul, in the first chapter of the Epistle to the Romans, revolting as it is, is fully justified by the descriptions of the writers of the time. This state of things was aggravated by the vicious extravagances of many of the emperors; by the venality and turbulence of the Roman populace; and by the cruelty of the gladiatorial shows; until it seemed as if the bonds of society were loosened, and the whole fabric was tottering to its fall. No normal standard existed, to the ideal of which the more earnest spirits might aspire. No authoritative sanction was on record, stamping virtue with the approval of a higher power. Mankind were sinking into a slough of despond from which there appeared no way of escape.

There can be no question that the advent of Christianity materially hastened, if it was not the main cause of, the breaking up of the ancient system of civilisation. Like the wonderful image seen by Nebuchadnezzar in his dream, this system presented a complete and organised whole. The æsthetical portion, the arts, the poetry, the literature formed the head of gold, surrounded by a halo of glory which will never pass away. The arms and trunk, of silver and brass, aptly typified the philosophy, the laws, the jurisprudence of

the ancient world; but the substructure of iron and clay, on which the whole was based, representing the religion and morals of the period, formed a crude combination of friable material utterly without union or cohesion. Against this, the most wonderful fabric ever reared by human skill, the stone cut out of the mountain without hands impinged by a force not its own, and the gold and silver, the brass, iron and clay crumbled into a chaos of irretrievable ruin. There was no help for this. The civilisation of the ancient world was closely and intimately connected with its religious beliefs. "The religion of the nations was not merely a speculative doctrine, professed in the schools or preached in the temples. The innumerable deities and rites of polytheism were closely interwoven with every circumstance of business or pleasure, of public or private life; and it seemed impossible to escape the observance of them, without at the same time renouncing the commerce of mankind, and all the offices and amusements of society." "The philosopher, who considered the system of polytheism as a composition of human fraud or error, could disguise a smile of contempt under the mask of devotion, without apprehending that either the mockery or the compliance would expose him to the resentment of any invisible, or, as he conceived them, imaginary powers. But the established religions of Paganism were seen by the primitive Christians in a much more odious and formidable light. It was the universal sentiment of the church that the demons were the authors, the patrons, and objects of idolatry."*

Loyalty to the truth was the first maxim of Christianity, in the balance against which all the culture, art, and philosophy of accumulated ages was but as a feather weight. The disintegrating influence of Christianity was supplemented by the irruptions of the barbarian hordes, and the result was,

* Gibbon, *Decline and Fall*, chap. xv.

from the sixth to the eleventh century of our era, a state of society combining every element of disorder, rapine, misery and barbarism. The discipline was a sharp and severe, but necessary one. Out of this chaos slowly arose the stately form of modern civilisation, with its grand proportions, its noble aims, its all-embracing sphere of inquiry, and the motto of progress emblazoned in living characters on its front. It is not within my province to detail the successive steps by which our present vantage ground has been gained. We will accept the position with gratitude. We are heirs of all the ages, of the accumulated wisdom of all time; but with the treasure we have inherited the responsibility. Let us examine our present position, and inquire what are the characteristics and tendencies of modern civilisation, and the future to which they point.

"Not in vain the distance beacons. Forward, forward, let us range,
Let the great world spin for ever, down the ringing grooves of change."

The first and most characteristic feature of modern civilisation is its mastery over the powers of nature, and the utilisation of its forces. In this respect the last century has done more for mankind than all previous ages. Physical power in this sense was almost entirely unknown to the ancients. The wonderful agency of heat, acting through the expansive force of water in the form of steam, has multiplied man's physical strength many thousand fold. Collaterally this has led, by stimulating invention, to various other discoveries, extending the dominion of man over nature. Many of these, such as gunpowder, the mariners' compass, and the invention of printing, preceded by ages the application of steam power; but each of these inventions has since been developed to an extent which without this would have been impossible. There is not a department of human

industry into which this element of physical power does not largely enter. We see it developing more and more every day, and there is no limiting the extent to which it may be carried. Now, apart from all adventitious circumstances, what should we expect as the natural result of this enormous accession of physical power? Supposing the human race were all one family, toiling painfully for sustenance with the feeble strength with which Nature has endowed our bodies, and each interested in the welfare of all, and a common partaker in the general benefits; and suppose that a discovery were made which, whilst lessening labour by one half, at the same time doubled production, it is obvious that the result would be either a greatly diminished necessity for labour, or a greatly increased share for each in the comforts and conveniences of life—probably a combination of both these advantages. We must not lose sight of the fact, that notwithstanding all the complications of society, and the vast gulf which seems sometimes to yawn between the higher and the lower classes, between the prince and the peasant, the capitalist and the artisan, there are links which bind us all together, which cannot be broken. The lowest claims his right to sustenance in exchange for his labour, and the highest has duties and responsibilities which he cannot shirk if he would. What are the strikes, the picketings, the lock-outs in the manufacturing world, the uneasy ground-swell in the agricultural districts, but crude attempts to solve the problem of the share in the national stock which belongs to each? Capital and labour, which ought to be as united as the "Great Twin Brethren" who fought so well for Rome, bitterly contend for their share of the spoils which their joint industry has won. How is the great contest to be settled? What are the tendencies of modern progress in this direction, and what is the future of industry to be? There are a few symptoms which present themselves to those

who can look beneath the surface shewing the direction of the current, and a few warnings of rocks and shoals which lie ahead to which we should do well to take heed.

If we compare the condition of the working man of to-day with his predecessor a century ago, or at any previous period, I think there can be no question that in exchange for his labour he now gets a larger *amount* of the comforts of life. I do not say a larger *share* of the general stock, for that depends on the solution of the question whether he has advanced at the same pace as the general mass of society. All ranks have benefited by man's modern command of power. Here I touch on a somewhat delicate question, but it is one which must be faced. None will dispute the fact that it is industry which has so enormously increased the wealth of this and all other civilised countries in modern times, increasing in ever accelerated ratio. Now it will not be going too far to say that the largest proportion of this benefit has been derived by the owners of fixed property, especially by the proprietors of large landed estates, which have increased in value without any care, forethought, effort or industry on the part of their owners. No one with any regard to the welfare of the country would grudge such fortunate individuals their ever increasing possessions, but it would be well for them to consider that it is possible to push the rights of property so far that a reaction might take place. Time will not permit me to give more than a single illustration. A considerable portion of London is held on leases for limited terms from large landed proprietors, at the expiration of which terms, the property, with all its erections, and the enormous increase which industry and labour have imparted, reverts to the lessor, who has never expended one shilling upon it. It is in vain to say that this is free contract between buyer and seller, since the article is a monopoly for which the possessor can exact his own terms. Cases

of this kind indicate dangers which may be avoided by timely consideration.

We cannot suppose that we have reached the utmost limit of man's command over the powers of nature. Fears have been entertained, perhaps well founded, that the supply of coal, the great instrument for producing power, may fail; but there are other forces in store, scarcely as yet tried. Magnetism and electricity lie ready to man's hand to an illimitable extent; and science is almost daily lifting the veil which has hitherto concealed many of the vast resources which lie waiting to be appropriated.

The question then stands thus. Physical science is constantly on the advance, and must continue to increase the general stock of production, the common property of society. The distribution of these advantages must depend on a variety of circumstances, some patent, others occult, such as the state of education, political institutions, the pressure of population, the standard of comfort, &c. There never was a period when wealth accumulated to a greater extent amongst the upper classes in our own country; but in some other countries the institutions tend to prevent this, and to increase the influence and position of the middle and artisan classes. On the whole, so far as concerns Christendom, the prospect is hopeful, and there is every reason to believe that the progress of science and invention will tend to benefit humanity as a whole.

To physical progress we owe the modern facility of intercourse; and never in the history of the world were such advances made in this direction as at the present day. Isolation is unfavourable to development. The narrow circle of ideas proper to any single community tends to harden into a barrier of prejudice, which can only be broken down by the interchange of thought from other sources. Civilisation entirely self-developed is almost unknown in the

annals of the human race. The Romans were the great road makers of antiquity. From the eternal city as a centre, there radiated in every direction substantial well-constructed thoroughfares, connecting the extreme limits of the empire, more than four thousand miles from one extremity to the other. No sooner was a country or district colonised or conquered, than the industrious cohorts were set to work; bridges were built, valleys raised, mountains perforated, and lines of communication established, many of which remain perfect to the present day. The uniformity of character stamped upon the Roman Empire was due in a large measure to this facility of intercourse.

What the Roman road was in comparison of the sheep track or mule path which it superseded, such is the modern railway in relation to the Roman road, but in a far higher degree.

It would be difficult to over estimate the advantages possessed in modern times by the introduction of the railway and the steam boat. They have changed the map of the world; they have altered the boundaries of states; they have revolutionised the art and practice of war; they have given new directions to trade and commerce. They have opened up new channels of industry; shortened by thousands of miles the great lines of communication; and when to these we add the most marvellous achievement of modern science, the telegraph wire, which practically annihilates time and distance, the present age seems separated from that which preceded it, not by an interval of years, but by cycles of time.

What then are the tendencies and prospects presented by these unexampled facilities of intercourse? One certain result must be the breaking down of the prejudices which have operated as barriers, keeping aloof the different branches of the human family. A striking illustration of this recently

occurred in the banquet given in July last by the Lord Mayor of London to the civic dignitaries from all parts of Christendom, when the Mayor of Quebec sat side by side with the Burgemester of Bergen, the Syndic of Rome toasted the Lord Provost of Edinburgh, and the Prefect of the Seine was welcomed as representative of the municipal institutions of a people formerly considered our natural enemies.

By means of this improved intercommunication, the ideas and principles of the different races and peoples interpenetrate and react on each other; all begin to find they have something to learn; the natural antipathies which repel are found to be baseless, and give place to the kindly sympathies which attract the different members of the human family.

Perhaps the most remarkable example of this collapse of the barriers of prejudice is to be found in the revolution which has taken place within the last few years in the ideas and relations of the Japanese people. In a condition the most isolated and most repellent of all foreign intercourse of any nation in the world, finding the force of circumstances too strong to resist, they have accepted the situation, thrown prejudice to the winds, and are now as eager to come to the front in the race of modern progress as they were formerly earnest in resisting all advances.

Closely connected with the improved intercourse of modern times is the colonisation of the world. The earliest colonisers of whom we have any record were the Phœnicians, who were the pioneers in extending westward the commerce and culture of the east. After them came the Greeks, perhaps the most skilful colonists of any period, who surrounded the Mediterranean basin and the Adriatic with Commonwealths imbued with the arts and literature of the mother country, the influence of which has endured even to the present day. The Romans were no colonists in the

proper sense of the term, although we get the name from them. They were conquerors, not planters; yet even amongst them the colony was an institution of great utility and power. Their colonies were intended to keep in check a conquered people, and to act as outposts to maintain the ascendancy of the Roman empire. The colonists had all the privileges of Roman citizens; each colonia was in its institutions a transcript of the Imperial city from which its authority was derived; and there can be no question that long after the irruptions of the barbarians, when Gaul and Spain and Lombardy were subjugated and reduced to servitude, the institutions of Rome survived in the cities which were established as Roman colonies.

After the discovery of America, Spain and Portugal naturally took the lead in colonisation. From this source, Central and South America have derived, for good or for evil, their character, their language, their religion, and their institutions. Holland and France next came into the field, the former in the Cape Colonies, Guiana, West Africa, and the spice islands of the East, and the latter in the wide expanse of Canada, and in the West India islands. England was last in the field, but has cultivated it to a greater extent and with a more successful result than is elsewhere found; nor is it now possible for any other nation to overtake us in the race. In this category I of course include the United States, kindred in origin, language, and institutions. At the present day, the English-speaking race are the only colonisers. Over the continent of America, north of the Gulf of Mexico, their influence is predominant; the islands of the Pacific, the vast continent of Australia, own their sway. Africa in its southern portion is part and parcel of the British empire; India with its teeming millions owns our Queen as its empress; and British Burmah is drawing us nearer to the confines of the far east. We might thus far

say that England is at the present day the only colonising nation; but here we are confronted with the irrepressible expansive power of another race, utterly diverse in all its aspects and character, but which of late years has developed a marvellous capacity for colonisation and extension. The Chinese, who constitute in numbers one-fourth of the human race, impelled probably by misgovernment and poverty at home, are pushing out their surplus population amongst the islands of the Indian Ocean, the West Coast of America, and the English settlements in Australia. This emigration is likely to continue in an accelerated ratio, and may be fraught with most important results. The Chinese are an ingenious, industrious, thrifty and peacable race, who will thrive where a European would starve, but who in the event of their ascendancy would be found treacherous, cruel, and unprincipled. The result of the competition of the Western race, few in numbers, but strong in native and acquired force, with the countless hordes of the weaker race, endowed with native capacity and skill, but weak in energy and power, is a problem which time alone can solve. The present and increasing facilities of intercourse are rapidly bringing to a point the issues involved.

From this we are naturally led to the influence of language on the future destinies of the world. There is nothing to which a people cling with more pertinacity than their mother tongue; yet history tells us that repeatedly, in the course of ages, the language of entire countries has undergone a thorough change. Spain, Portugal, and France, inhabited by Celtic and Iberian populations, adopted almost entirely the language of their conquerors; and many dialects, such as the Cornish and Pictish, have died out and left no trace behind. The languages of modern continental Europe have little room for expansion. German, French, and

Italian are not likely in future ages to be spoken by much larger populations than at present. Spanish and Portuguese will be preserved and extended by the republics of Spanish America and the Empire of Brazil, the growth of which is slow and feeble. But contemplate the future of the English tongue. At the present day it is spoken by upwards of ninety million souls. From the Atlantic to the Pacific, and from the Gulf of Mexico to Labrador, it is the predominating language. In the islands of the Pacific, the broad plains of Australia and Tasmania, the Cape and African Colonies, it is the mother tongue, and over the vast empire of India its influence is yearly increasing. In another century, there can be little doubt that the English language will be spoken by two hundred millions of people. Consider for a moment what this implies. Language is not the mere vehicle of communication between individuals. Language means literature, ideas, modes of thought, laws, institutions. Whatever race a man belongs to by birth, let him be affiliated into a society by a common language and he imperceptibly and necessarily imbibes the principles and modes of thought of those amongst whom he moves. With advancing education, the recorded literature obtains more and more influence, and gives character and expression to the ideas of the race. We see this strikingly exemplified in the United States of America. A very large proportion of the immigrants belong to alien races, but it is found that, after a generation or two, every distinctive mark of origin is obliterated, and the traits of the original English Puritan character take their place. Whatever races may in the future compete in point of numbers with those of Anglo-Saxon descent, the seeds of progress and improvement scattered broadcast over the world from the rich stores of English literature must have a predominating and beneficial influence. What a future is here opened up for English writers of coming generations!

"Of those that eye to eye shall look
On knowledge; under whose command
Is earth and earth's, and in their hand
Is Nature, like an open book."

From this little island as a centre, a key-note struck shall reverberate and bring out a harmonic response from the remotest regions of the globe. Truth and justice, freedom and right, wisdom and knowledge cannot but be gainers by the extension of our language and literature.

"Ultima Cymaei venit jam carminis aetas;
Magnus ab integro saeclorum nascitur ordo.
Jam redit et Virgo, redeunt Saturnia regna."*

There is only one other language and people which give the promise of wide extension in time to come; I mean those of the Russian empire, as representative of the great Sclavonic race. That there is a great future for this race in the extension of order and civilisation over the vast extent of Northern Asia with its nomadic population, there can be no doubt, but its mission is marked out and limited by nature and circumstances, and will scarcely interfere with other European influences for many ages to come.

The intellectual future of the world will necessarily be affected to a very large extent by the amount and kind of education imparted to the masses. On this I have only a word or two to offer. That education will advance, and in its general practical influences be brought within the reach of all, is a settled point; but, from the vast area of the field which knowledge now occupies, there is a fear that for the

* Virgil, *Ec.* iv. v.

"The last great age foretold by sacred rhymes
Renews its finished course; Saturnian times
Roll round again; and mighty years, begun
From their first orb, in radiant circles run."

majority what education may gain in breadth it may lose in intensity. We must, however, resign ourselves to the inevitable, satisfied that, on the whole, the human race will be immeasurably the gainers.

What will be the prevailing system of government in future ages is a problem which has frequently occupied speculative minds, and various solutions have been propounded. A few indications present themselves to our view. In our own highly favoured land, we have come to enjoy such a degree of settled liberty under a constitutional monarchy, that we naturally conclude it is the only—or at least the best—mode of reconciling order and stability with individual freedom and rights; but, if we look around us, we cannot but see that England is almost the only country in which this system has been completely successful. In the neighbouring countries belonging to what are called the Latin races we see a constant alternation between imperial despotism and democratic license, which is only despotism under another form. It must undoubtedly be admitted that if an educated community had for the first time to choose its government, it is not probable that it would take the form of a monarchy. The United States of America set the example. However loyal our colonies may be to the mother country, circumstances may easily arise which would lead to a separation, and no one could for a moment suppose that any of them would elect a king to reign over them. A constitutional monarchy is only possible when the line of succession is hallowed by tradition and cherished historical associations, where there is an aristocracy so far respected as to exercise a regulating influence on public affairs, and above all where there is mutual forbearance and aversion to sudden change:

> "Where Freedom slowly broadens down
> From precedent to precedent."

The late Richard Cobden was of opinion that, under the benign influences of free trade, war and contention would cease, and that the government of the future would ultimately resolve itself into an agglomeration of self-governed municipalities, without the necessity of a common centre. This is scarcely probable or desirable. There are many cases in which justice, morality, self-preservation, and progress require a nation to act as a whole. I am no prophet, and can only indicate what appear the tendencies of human affairs. England will long preserve her admirable constitution, under which she has attained to so high a degree of prosperity and success; but her daughter colonies, which have developed under such different auspices, will not follow in the steps of their parent, and in the world's future government this cannot but have a very important and decisive influence.

With the progress of enlightenment and the increased influence of reason on the minds of men, is it probable that within any definite period wars will cease? This has been a favourite vision from the time of the old Hebrew prophets, who saw from afar the time when "nation shall not lift up sword against nation, neither shall they learn war any more," down to the period of international exhibitions and free-trade demonstrations. Apparently, in recent times, the evil, so far from being extenuated, has been greatly aggravated. Never were such multitudes brought into the field; never was science so laid under contribution, or were operations conducted on so grand a scale for the destruction of human life as in the late Franco-German war. The vast preparations continually kept up familiarise the mind with war as the normal state of things, and naturally lead to it on the slightest occasion.

> "How oft the sight of means to do ill deeds
> Makes ill deeds done!"

Yet, if we look below the surface, there are symptoms which unmistakably point towards a reaction. The very perfection of warlike means may possibly stultify their ends. The enormous costliness of a campaign to those engaged in it, whether victors or vanquished, necessarily shortens its duration. Contests like those of the thirty years' war in Germany, or the European conflict arising out of the first French Revolution, are now impossible. The exhaustion of the resources of the combatants would bring the war to a close within a very limited period.

It has been common to attribute all the evils of war to the governments of the countries engaged. Cowper says—

> "But war 's a game, which, were their subjects wise,
> Kings would not play at."

This, however, in modern times at least, is a fallacy.

The late war between France and Germany, and the civil war in America, were eminently contests stimulated by popular feeling, and supported by public enthusiasm. Such being the case, we cannot help anticipating that a time will arrive, with the increased intercommunion and better acquaintance of the peoples, when bitterness and prejudice will cease, and the causes of war will die out.

At the same time, it is not to be expected, nor indeed to be desired, that the resort to war as the ultimate appeal when great principles are at stake should be superseded. War is so dreadful a calamity, and brings so many horrors in its train, that any apology in its behalf may seem inhuman and paradoxical, yet in a choice of evils there are worse things than war. Slavery is worse; tyranny is worse; religious persecution is worse; slothful submission to corruption and degradation is worse. There have been national uprisings against oppression and wrong which are justified by the holiest and noblest sanctions.

Mr. Lecky says—"War, which brings with it so many demoralising influences, has at least always been the great school of heroism. It teaches men how to die. It familiarises the mind with the idea of noble actions performed under the influence, not of personal interest, but of honour and of enthusiasm. It elicits in the highest degree strength of character, accustoms men to the abnegation needed for simultaneous action, compels them to repress their fears and establish a firm control over their affections. Patriotism too leads them to subordinate their personal wishes to the interests of the society in which they live. It extends the horizon of life, teaching men to dwell among the great men of the past, to derive their moral strength from the study of heroic lives, to look forward continually through the vistas of a distant future to the welfare of an organisation which will continue when they have passed away."*

Those who, with the best intentions, are opposed to war on any occasion and for any cause, are apt to forget that all human laws are based in the last resort on physical force. The policeman who protects our life and property, the officer who arrests the culprit, the judge who pronounces sentence; the legislature which makes the laws, and the officers who administer them; are assured in their respective vocations by the reserve of physical force always at command, without which society would run to disorder, and would be at the mercy of the evil disposed.

In the intercourse between independent nations there is no common power to which to appeal. The arbitration which is so often referred to may serve to adjust a disputed boundary, or to settle the terms of a claim for pecuniary damages, but in matters of vital principle it would be rejected with contempt. Can any one suppose that questions like

* *Hist. Europ. Morals*, i. 128.

the cession of Alsace and Lorraine, or the independence of the United States, would ever be submitted to arbitration? War then must, so far as we can see, be a power kept in reserve to be appealed to in the last resort. Under present circumstances, with its increasing cost and difficulties, it is not likely to be lightly resorted to; and the great occasions on which it would be inevitable will probably diminish with time.

A few words may suffice on the æsthetical aspect of modern civilisation. In those departments which were the peculiar excellence of the ancient world, the moderns cannot compete. We have no sculpture to equal that of Phidias and Praxiteles; no refinement of architectural forms to equal the Parthenon; no ceramic elegance of production, or application of beauty to ordinary implements such as prevailed under Greek influences. We have no epics like those of Homer, no dramas for intensity and power to equal those of Sophocles and Euripides, no odes like those of Horace, no eloquence to compete with Demosthenes and Cicero, no histories like those of Thucydides and Tacitus. In style, the ancients stand upon an eminence unapproachable by the moderns.

There are, however, a few points on which modern art may be fairly said to have marked out a path of its own. The love of nature, both in art and poetry, is almost entirely of modern growth. Horace, in his "Art of Poetry," makes no reference to external nature as an object of study. Virgil's love of the country breaks out from time to time in verses which make something of an approach to modern susceptibilities. In the second Georgic, for instance, after the well-known apostrophe—

> "O fortunatos nimium, sua si bona nôrint,
> Agricolas;"—*

* "Oh! happy, if he knew his happy state,
The swain."

occurs the following passage:

> "Speluncae, vivique lacus; at frigida Tempe,
> Mugitusque boum; mollesque sub arbore somni
> Non absunt; illic saltus ac lustra ferarum."†

Other passages of similar character might be quoted, showing that Virgil almost stands alone amongst the ancients in his appreciation of natural scenery.

This sympathy with nature was of slow growth amongst the modern poets. In Dante and the great Italian poets of the fifteenth and sixteenth centuries there is very little of it exhibited. Samuel Taylor Coleridge says of them—"Their imagery is almost always general; sun, moon, flowers, breezes, murmuring streams, warbling songsters, delicious shades, lovely damsels, nymphs, maids, and goddesses are the materials which are common to all, and which each shaped and arranged according to his judgment or fancy, little solicitous to add to or to particularise."

To our own poets may fairly be ascribed the honour of having led the way in the modern appreciation of nature. Chaucer has some exquisite descriptions of natural phenomena. Shakespeare, on this as on every other subject, is eminent for truthfulness of delineation and poetical personation. Milton's descriptions of natural scenery fall like rich music on the ear; and from thence onwards in Dryden and Pope, and Gray and Cowper, and Thomson and Scott, and Wordsworth, and Shelley, and Tennyson, we have an appreciation of natural beauty, and an expression of its harmonies and sympathies with human nature, unsurpassed in any language or literature.

† "Cool grots, and living lakes, the flowery pride
Of meads, and streams that through the valley glide,
And shady groves that easy sleep invite,
And after toilsome days a sweet repose at night.
Wild beasts of nature, in his woods abound."

This again has reacted on Modern Art. Landscape painting was unknown in the ancient world, and in modern times could scarcely be said to have an existence before the time of Claude Lorraine and Poussin. At the present day, poetry and painting vie with each other in their subtle insight into the rich analogies of nature with the human mind, and a source of pleasure, refinement and elevation has been opened which was utterly veiled from the world of antiquity. There is no reason to believe that this will slacken in its intensity or diminish in its quantity, and it must contribute largely in the future to the education of the world.

A very pleasing feature of modern civilisation as compared with the ancient is the far larger amount of sympathy with human suffering. When we read in ancient history, both sacred and secular, of the little regard manifested for human life; of the massacres of entire peoples; of the sacking and burning of towns, and the reduction to slavery of the inhabitants; when in the time of calamity, of plague and pestilence, of fire and tempest, little or no effort appears to have been made for the relief of the sufferers, we seem as if reading of another and alien race of beings. The sentiment put by Terence into the mouth of one of his characters,

"Homo sum; humani nihil a me alienum puto."*

is quoted by Cicero as an expression very extraordinary and remarkable.

Whatever might have been the case in former times, lack of human sympathies is not one of the vices of the present age. There is scarcely one of the ills which flesh is heir to which has not provision made for its alleviation; scarcely a calamity which occurs, whether it be a famine in a distant part of the

*"I am a man, and feel for all mankind."

world, or an inundation in a neighbouring country; a mine explosion, a cotton famine, or a potato rot at home, that a sympathetic feeling is not immediately called forth, and organised efforts put forward in relief. War, hateful as it is, has its horrors alleviated by generous liberality and active self-denying devotion. No sooner is a soldier struck down, than from an enemy to be sacrificed he is converted into an object of compassion to be relieved. This is one of the noblest and most promising aspects of modern times, and contrasts very favourably with every period which has gone before. It is not probable that this feeling will diminish. Our outlook into the future is cheered and brightened by the glow communicated by the warm sympathies of the human heart.

I have left to the last a few thoughts on the most important element in any prospect of the world's future—the influence of religion. The subject is fraught with difficulty, but it cannot be omitted in any general view such as we are now taking. I have no desire to enter into polemics. Dogmatism, and even theology, would be here entirely out of place. Yet I think it may be possible to consider the question from a philosophical point of view, irrespective of special creed or dogma.

During every period of the world's history, religion has played an important and influential part. There is in the mind of man an irrepressible instinct yearning after the spiritual, the unseen, and the future. There is hardly a savage race so degraded in which this feeling does not develop itself in some fantastic form. If we extend our researches as far back as it is possible to go into the early history of the human race, and by analogy into the dim prehistoric period replete with shadowy outlines and strange fantastic forms, we find that religious and moral aspirations were closely connected, and mutally influenced each other.

As we proceed onwards, we find this connection gradually loosening, and finally almost entirely dissolved. "One of the first facts that must strike a student who examines the ethical teaching of the ancient civilisations is how imperfectly that teaching was represented, and how feebly it was influenced, by the popular creed. The moral ideals had at no time been sought in the actions of the gods, and long before the triumph of Christianity, polytheism had ceased to have any great influence upon the more cultivated intellects of mankind."*

The introduction of Christianity restored that connection which was one great element of its success. As stated by Gibbon: "The primitive Christian demonstrated his faith by his virtues; and it was very justly supposed that the divine persuasion which enlightened or subdued the understanding, must at the same time purify the heart, and direct the actions of the believer. The first apologists of Christianity who justify the innocence of their brethren, and the writers of a later period who celebrate the sanctity of their ancestors, display in the most lively colours the reformation of manners which was introduced into the world by the preaching of the gospel."†

It is not within my province to enter into the history of the Christian Church in its relation to the world. It is rather my task to consider the phenomena which present themselves to our view at the present time.

If we take a general survey, we find there are four religions which exercise a large and powerful influence in the world, viz., Brahmanism, Buddhism, Mahometanism and Christianity. I omit from the category the fetichism and grovelling superstitions of the few remaining savage races, which soon die out when brought into contact with those more advanced. Upon each of these I will say a few words.

* Lecky, *Hist. Europ. Morals*, i., 169. † *Decline and Fall*, chap. xv.

Brahmanism is the lineal descendant of the original Aryan nature-worship, which exhibits in the Vedic hymns and other early productions many noble sentiments and spiritual aspirations. According to its doctrines when further developed, the visible world is the transient manifestation of the Deity, without real or permanent existence; the human soul is an emanation of the Divine Spirit in a perishable body, and in a state of misery; every effort of man should be directed during life to the liberation of his soul after death, and its lasting union with the Divine Being. This high and lofty theory reduced to practice became tainted with the most degraded superstitions. The original Nature-worship degenerated into orgies of the vilest character; the institution of caste imprisoned the minds of its votaries within a narrow circle of routine from which there was no escape, and the whole system sank into a hopeless condition of imbecility and narrow prejudice.*

This must have taken place at a very early period, since about a thousand years before Christ a reaction took place under a remarkable man named Gautama, or Sâkya-Muni, afterwards called Buddha, the sage. His doctrines were not essentially dissimilar from those of the early Brahminical writings, but he endeavoured to restore them to their purity, and inculcated the practice of virtue and self-denial with all the severity of the Stoics. He utterly rejected the institution of caste, teaching the essential brotherhood of all men. Pantheism is the essential principle of Buddhism. God is in every thing, and every thing is God. The human soul, after passing for a time in the vain show of this world, will eventually be united with the Divine essence in the happy

* "There are in Hindu books passages of unsurpassed beauty, and even purity, and which one might almost think expressive of the loftiest theistic worship. Yet these passages can influence but little those who read them, when they exist alongside of others as vile as these are noble. Nay, more, they positively hinder the spread of pure religion."—Robson, *Hinduism, &c.*, p. 215.

state of imperturbable serenity and apathy called Nirvána. The success of these reformed doctrines was amazing. They spread over the far east with remarkable rapidity, and though by a counter reaction the Buddhists were almost exterminated in India proper about the seventh century of our era Buddhism is still the prevailing religion in Ceylon, Thibet, Burmah, a large part of Tartary, and over the vast region of China; and boasts of by far the largest number of votaries of any religion in the world.

These two creeds are so closely united that it was necessary to take them together. What shall we say as to their future? First, as to Brahmanism, which is the prevalent religion in British India, and its dependencies. Has the attempt to Christianise India met with any success; or, as we are so often assured, has it been a complete and ignominious failure? I have endeavoured to investigate the subject, and have arrived at the following conclusions. During many years the introduction of Christianity into India met with the utmost opposition and discouragement on the part of the Indian Government, and it is only of late years that a fair field has been opened for voluntary effort. Another serious evil to contend with has been the opposition of a large part of the European population, especially the mercantile class, both in their avowed hostility, and in their treatment of the natives, which has brought discredit and aversion on the name of Christianity.

Under all these disadvantages, the success and progress will probably be a surprise to many. A census of religious belief was first taken in British India in 1851, when the number of native Protestant Christians was 91,092. In 1871, when another census was taken, they numbered 224,258, being an increase in twenty years of 140 per cent., or doubling themselves every fifteen years. At this rate of progress it would only take two centuries to Christianise the

whole of India, being less time than it occupied to make it Buddhist, and a far more rapid rate than that by which the Roman Empire was converted to Christianity.

There are many very hopeful signs in British India. The progress of education is loosening the bonds of the old puerile and debased superstitions. The attempts by the educated classes to substitute a philosophical Deism have met with little success. There is a soul's hunger in the native mind which philosophical theories cannot satisfy.

The following remarks by a recent writer of many years' experience in India* are worthy of notice. "There are traditions in the land which perhaps none has yet attended to with due concern, that the east will be completely changed by a nation from the west; and the tenth avatar of Vishnu, a man on a white horse, so current among the prophecies of the sacred Brahmanical writings, must be looked on to typify the advent of the English in India."

"There can be no doubt that Christianity will assume in India—must indeed assume, if it is to be universally triumphant—an Indian form. If the religion of Christ is a world's religion, it must be capable of assuming the form best suited for each nation of the world. It is absurd to suppose that a race which has shown so strong an individuality, especially so strong a religious individuality as the Hindus, can, in adopting Christianity, follow closely the European models. To suppose so would be tacitly to allow that Christianity was a European, not a Cosmopolitan religion."

"In nothing is the distinctive character of Indian Christianity making itself more felt than in its utter impatience of all sectarianism and sectarian formulæ. To Hindu Christians they are an abomination, a source of weakness and reproach. Both in Calcutta and Bombay, setting aside the

* *Hinduism, and its relations to Christianity*, by the Rev. John Robson, M.A.

distinctive articles of the churches, they are banding themselves together, and establishing undenominational missions among their heathen fellow-countrymen."

These are hopeful signs, and cannot be overlooked in making any estimate of the future.

The great inert mass of the Buddhist nations, comprising probably from a third to a fourth of the entire population of the globe, seems at first sight utterly hopeless. The untold myriads of the Chinese nation steeped in prejudice and contempt of the outer world, the hordes of Tartars degraded to the lowest stage of superstition, would appear utterly impervious to any outward impression Yet even here there are signs of movement; the dry bones are beginning to stir. The Japanese, a Buddhist people, are throwing off in disgust their old rags of idolatry, and preparing to clothe themselves in some form of western belief. China is abandoning one class of prejudices in regard to European improvements; and her annually increasing emigration must necessarily lead to the imbibing of new aspects and modes of thought. It must also be remembered that Buddhism pervaded the dense masses of China with almost unexampled rapidity, thoroughly overturning the old, and introducing a new national religion. Human nature remains the same in every age. It is as true now as thousands of years ago, that a little leaven with vital energetic power soon leavens the whole lump.

Mahometanism, as a Semitic outgrowth kindred to Christianity, stands in a closer relation to us than the eastern religions just referred to. Its three great principles of the unity of the Divine Being, the essential equality of all mankind, and the inculcation of temperance, combined with the unscrupulous use of force in its propagation, imparted to

Mahometanism a living power, which carried it in triumph, in the course of a few years, from the deserts of Arabia east and west, to the Himalayan Mountains on the one hand, and the Pillars of Hercules on the other. Its vitality appears to be exhausted, and fallen into a decrepit senility. It cannot stand the bright light of modern progress. Weighted with the degrading institutions of polygamy and slavery, inimical to education, and incapable of assimilating modern ideas, its representative in Europe is supported by the jealousy of the Christian powers in a condition of tottering decadence which cannot long delay its fall. The fair regions of the east, for ages reduced to torpor and desolation by its baleful influence, may then again smile with the light of life.

The present condition of the heathen world conveys to my mind the conviction that, like the handwriting on the wall of Belshazzar's palace, there is written on the face of all these institutions, "The kingdom is taken from thee, and given to those that are worthier than thou." Who are they that are to succeed to the inheritance?

We stand, then, confronted with these facts. Human nature must have a religion. The spiritual appetite craves for food; and, unsupplied with celestial manna, it has striven to supply its cravings with the husks of its own selection, until they have become utterly intolerable and loathsome. Under these circumstances, it appears to me that the only religion possible for the future is Christianity. Whether we believe its doctrines or not, Christianity is a fact. It is a fact that under its auspices and under the influence of its institutions all that there is in the world of enlightenment and progress has grown up. The atmosphere with which it has surrounded itself is redolent of life and vigour. Whilst every other part of the world has sunk into

torpor and decay, Christendom has displayed a vitality and energy which have unlocked the secrets of nature, which have measured and weighed the heavenly bodies, have sounded the depths of space, and brought back messages from far distant worlds. Where but in Christendom do we find developed that gentle spirit of humanity which has struck the fetters from the slave, has raised woman from a state of degradation to one of honour, dignity, and affection? Where also do we find sympathy with every form of human suffering, and provision for every mortal calamity? In the light of Christianity human life, with all its chequered scenes of joy and sorrow, assumes a new aspect and new relations. Strengthened by its convictions and animated by its hopes, the martyr has welcomed the stake, and the patriot cheered on to victory in the hour of dissolution.

Christianity in regard to civilisation has a three-fold bearing.

1st. It furnishes to man a motive power outside himself, derived from a personal being, in devotion to whom the heart can satisfy its widest cravings for sympathy and love.

2nd. It sets forth a standard of morality, so simple that the most ignorant can understand it, and yet so lofty that the holiest and wisest will always find it above and beyond them.

3rd. It is adapted to all climes, places, circumstances, and conditions; the highest state of cultivation, and the lowest conditions in which humanity is found. The burning deserts of Africa, and the snowy plains of Iceland; the dwellers in the crowded city and on the solitary moor are equally capable of imbibing its tenets, practising its precepts, and receiving its consolations. No doubt it may be said that in practice the result is far behind the ideal which is presented, but there is this essential difference between Christianity and every other religion the world has seen,

that the defects of its followers are owing not to the religion, but to the want of it, whilst in all the others the evils arise from the religion itself.

I apply these remarks not to this or that special form which Christianity may have assumed, but to its influence as a whole. Catholic and Protestant, Unitarian and Trinitarian, Episcopalian and Baptist, whatever their dogmatical differences may be, all acknowledge the divine motive power, the high moral standard, and the all-embracing adaptation of Christianity. So far as I am aware, there is no difference in the estimate of practical goodness in any of the sects into which Christendom is divided.

If these elements then be essential to the future progress of civilisation, or in other words to the perfection of humanity, and Christianity alone can supply them, it then follows as matter of necessity that Christianity is the only religion practicable for the future.

I have thus endeavoured, feebly and tentatively, to throw together a few thoughts of a speculative nature on the tendencies and future of modern civilisation. What will the end be? How far will man's perfectibility on earth be carried?

The world we live in is fair and beautiful, and capable of ministering to man's happiness in a far higher degree than has ever yet attained. Sin and sorrow, disease and death, will never be entirely eliminated, but they may be greatly diminished in intensity and pain. The golden age contemplated by the poets has always receded either to the far distant past, or to the equally distant future; but if it is ever to be found at all, it will be in the living present. The Divine Teacher, with that truth to human nature which is visible in all his words, to his disciples' enquiry, when that golden age, the Kingdom of God, should appear, replied "The kingdom of God cometh not with observation, neither

shall they say, Lo here, or Lo there! for behold the kingdom of God is within you." Yes, we may all make our own golden age by doing our duty, by suffering if need be, by the diligent employment of the talent committed to our charge, by serving our generation, and thus helping to prepare the way for

> That far off divine event,
> To which the whole creation moves.

THE TRUE MACBETH.

By EDWARD R. RUSSELL.

It is said, ladies and gentlemen, that the drama, especially the acted drama, and pre-eminently the Shakspearian drama, is recovering its position in the estimation of cultured persons. I am not careful to consider whether this is so or not. If it is, so much the better for cultured persons; if it is not, so much the worse for them. In either case the drama, at least so far as its published repertory is concerned, is independent of their patronage. It will never owe much to the condescension of the supercilious, and we may hope there will always be a histrionic remnant to preserve its traditions, and to make new ones. As a student both of plays and the stage, I am glad that "Macbeth" is prominent in the public mind of 1875, as "Hamlet" was in 1874; but under any circumstances an enquiry into the true reading of the play would have been an undertaking worthy of this Society.

By the true Macbeth I do not mean the historical Macbeth. Of his reign, George Buchanan says, "Some of our writers do here record many fables which are like Milesian tales, and fitter for the stage than for history, and therefore I omit them." Before many years had elapsed, these mythical stories, so far as they met the taste and suited the purpose of the dramatist, had passed into the atmosphere for which Buchanan thought them most suitable. And from that time forward the only Macbeth was Shak-

speare's. Of his prototype we know from the chronicler Holinshed that he was a most valiant gentleman, and one that, if he had not been somewhat cruel of nature, might have been thought most worthy the government of a realm. Like other sanguinary despots—besides exhorting young men to exercise themselves in virtuous manners, and men of the church to attend to divine service according to their vocations—he made himself thought by the commonalty a just king. He appears to have beheaded only the tall poppies, and was even described as the sure buckler and defence of innocent people. But as respects his conduct towards the thanes, the history bears as black a record as the play. At length, the chronicler tells us, he found such sweetness by putting his nobles to death, that his earnest thirst after blood in this behalf might in no wise be satisfied. Here we perceive a sort of pleasure in blood-guiltiness which the play has not in the slightest degree imitated. In the chronicle, moreover, there is only a mere mention of Lady Macbeth's ambition and instigation, the simplicity of which allusion is most remarkable. As at once fixing the two principal original contributions of Shakspeare to the subject, it deeply impresses me with the view of the play's main meaning, which I shall presently endeavour to state. Instead of his wife, Macbeth, in Holinshed, has for his coadjutor in regicide Banquo, whom Shakspeare, on the contrary, has made an altogether honourable and estimable man in the midst of villanies which he entirely understood and might have been privy and party to. Banquo is murdered, in the history, however, all the same, "for the pricke of conscience (as it chanceth ever in tyrants, and such as atteine to anie estate by unrighteous means) caused Macbeth ever to feare, least he should be served of the same cup as he had ministered to his predecessor." In the inception of his ambition, the Macbeth of the chronicle is inspired and

befooled by the witches—"resembling creatures of elder world"—and, after recording their first meeting, almost precisely as in Shakspeare, Holinshed goes on to say that the incident was reputed at the first to be a vain fantastical illusion, got up by the two generals; but afterwards the common opinion was that these women were either the weird sisters, that is to say, the goddesses of destiny or fates, or else some nymphs or fairies endued with knowledge of prophecy by their necromantical science, because everything came to pass that they had spoken. As to this, we are of course entitled to suppose, as we list, either that such doubts did prevail in Macbeth's time, or that in Holinshed's time they were believed so to have existed. As in other Macbeth questions, the interest of the witch element has come to centre entirely in Shakspeare's use of it, which, it is part of my purpose to show, has been considerably misconstrued. The murder of Duncan in his sleep, and the confused condition of the grooms when they awake, may have been suggested by a passage in the chronicle relating to another incident, namely, the massacre of King Sueno's Danes in their camp by Macbeth, under the orders of Duncan, after the Scots had treacherously drugged their ale and bread. In closer correspondence with the play we have the fact that Macbeth, as king, had in every thane's house "a sly fellow in fee." There is also—and so nearly identical that Shakspeare may be said to have merely turned it into verse—the curious conversation between Malcolm and Macduff, when the latter seeks the former in exile: an episode which lies apart from the necessary action of the play, and which was evidently adopted by the poet, because he was struck, as he well might be, by its originality. Lastly, we have the juggling charm of Birnam Wood and Dunsinane, the assurance by a certain witch in whom he had great trust, that Macbeth should not succumb to one of woman born, and the catastrophe, turning

as strictly as in the play, on the non-fulfilment of these "words of promise."

So much for the true Macbeth of the chronicler. For us it is only important to notice that almost every purely dramatic point was supplied or suggested to Shakspeare, and that his most substantial additions were subjective. He was too thorough a playwright not to improve to the utmost on the incidents and situations with which he was provided; but, intellectually, the most important of his contributions were in the domain of character and ethics. Even the magnificent conception of the sleep-walking scene, though it has given to the stage one of its finest and most celebrated episodes, is psychological, so far as it is not simply awing and pathetic.

If we avoid discussing the true individuality, and the reality of the Macbeth of historical tradition, not less shall we keep clear of the question, Whether the play, as we have it, is the true Macbeth of Shakspeare? Those who wish to see this called in question under the newest lights may read the terse and interesting preface to the play in the Clarendon series, by Messrs. Clark and Wright, of Trinity College, Cambridge. Without decrying such studies, or underrating the qualifications of these gentlemen for pursuing them, I must say that the results rarely impress me as true or acceptable. It is with them as with much modern criticism on internal indications of authorship and authenticity in the gospels, and especially the fourth. A number of vastly wise and very positive conclusions have been arrived at, which any sciolist might fix for ever in his sterile mind by a couple of days' study. When obviously true they are conspicuously worthless; when not palpably certain they may be safely rejected. They are small and technical, dull and dry, unfruitful in great inferences, devoid of spiritual insight.

They irritate a little, like moribund flies, but they do not render religious life or literature utterly unbearable, and now and then comes genius—as in the recent criticism of Matthew Arnold — and throughly fans them into space. Messrs. Clark and Wright are amongst the most reverent critics on the internal evidence of Shakspeare, but, to take an example, they mention, as singularly weak, and as an unskilful repeating of other passages, the weary soliloquy in the fifth scene of the fifth act of "Macbeth":

> If this which he avouches does appear,
> There is nor flying hence nor tarrying here.
> I 'gin to be aweary of the sun,
> And wish the estate o' the world were now undone.

These lines are surely full of truth and pathos. They are rhymed according to a mannerism of the period, and when Shakspeare introduced such couplets, it frequently rendered some of his verses unequal in expression. If he had been writing prose or not in rhyme, he would not have composed the last line of the four we have just read. Still the idea even of that line is a good one, and if it were bad we could endure fifty such for the sake of that which precedes it. The words "I 'gin to be aweary of the sun" are so spoken by great actors that the auditor in the theatre almost feels beating upon his own head, and glazing his own eyes, the dry, fretting heat of the sun, which, if you have noticed, is most grievous in times of mental depression. Even without this special effect—which, by the by, compares curiously with Malcolm's

> Let us seek out some desolate *shade*, and there
> Weep our sad bosoms empty—

the idea of weariness of life is, with any reading of the lines, most affectingly conveyed. The value of dogmatic internal criticism might be staked on this instance; and even if a

manuscript of the lines signed Thomas Middleton were discovered, we might fairly suspect a forgery.*

Without standing out for the genuineness of every line in the play, I confess that I find it all good enough for me; and some of the arguments by which excisions are advocated are extremely shallow and apparently uninformed by a wide observation of Shakspeare's manner. If there is anything utterly below par—as Coleridge deemed the episode of the porter—it is quite as likely that Shakspeare, in his capacity of theatrical manager, tried to catch the groundlings as that any one else did it in his name; and you probably could not cut a line out of even the most inferior passages with any certainty that you would not hereafter regret it.†

Two textual suggestions are made, however, which bear upon the true meaning of the tragedy. One is for the exclusion from the text of the bleeding sergeant. Here we are told of slovenly metre, of language more bombastic than Shakspeare's even when most bombastic, of inconsistencies with the next scene, and of the absurdity of news of a victory being sent by a wounded soldier. It may be the fault of long and loving familiarity, but these hypercriticisms fall flat and flaccid on the Shakspearian sensorium. Turn to the scene. It is certainly set in a strident key, but that key is appropriate to the situation and character of an excited soldier, just returned from a terrific engagement in which his idolised general has achieved prodigies of personal valour and slaughter. Nor is the bombast excessive. It is

* No doubt there is a difficulty in reconciling lines 52 and 53, of Scene II., with lines 72, 73, 112, *et seq.*, of Scene III., but it is not stated that the thane of Cawdor was killed, and by a stretch of courtesy or argument Macbeth might call him prosperous. At worst, the difficulty is not so important as the loss of the scene would be serious.

† Shakspeare's taste was far from faultless, or he often allowed it to lapse into quiescence. One of his worst lines—one of the worst lines in any poet—

"His silver skin laced with his golden blood,"

occurs in the splendid scene after the murder of Duncan, and has never been questioned, though Dr. Johnson expressed a just contempt for it.

one of Shakspeare's especial marks that though he never forgets the distinctive characters of his personages, he freely endows them with his own imagination. This bleeding sergeant revels in images of wild warfare, intermingled with pregnant phrases that have become household words. It is in this scene that we have the description of a nearly balanced battle:

> Doubtful it stood
> As two spent swimmers, that do cling together
> And choke their art.

Here, too, is a bold apposition between Macdonwald, with fortune smiling on him, like a rebel's wanton, and Macbeth "*disdaining fortune*," like *valour's* darling, carving out his passage with his brandished steel. Here, also, is the scornful reply to King Duncan's question, as to the onslaught of the Norwegian reinforcements:

> Dismayed not this
> Our captains, Macbeth and Banquo?

"Yes," says the excited sergeant, taking no thought of the majesty of his interrogator:

> Yes;
> As sparrows, eagles, or the hare, the lion.
> If I say sooth, I must report they were
> As cannons overcharged with double cracks; so they
> Doubly redoubled strokes upon the foe:
> Except they meant to bathe in reeking wounds,
> Or memorise another Golgotha,
> I cannot tell—
> But I am faint, my gashes cry for help.

To appreciate this passage you must imagine it vividly acted. You must conceive this wounded soldier's elocution becoming more feverish as his strength fails him. If you realise this conception, I am afraid you will not have much patience with the cool and collected critic in cap and gown who

remarks that it was really a very thoughtless thing for Macbeth to send a wounded man a long distance with an important message.

What is most necessary, however, to observe, is what an essential function this scene performs. It happens that in the representation of "Macbeth" which is now the talk of the literary and dramatic world, the bleeding sergeant is omitted. What has ensued? It has been said that Mr. Irving cut out the description of Macbeth's prowess because it conflicted with his craven view of the part, or because it would not do to create an image of Macbeth which his physique would not enable him to maintain. The first suggestion libels the judgment of one of the clearest judges of dramatic character. The second calumniates the good faith of one of the most honest actors that ever trod the boards. Neither is probable. Most likely the bleeding sergeant was deleted because it was desirable to shorten the play; because there seemed to be enough about Macbeth's valour without this scene; and because the two Cambridge gentlemen had pronounced against its genuineness. But how strongly the result justifies the judgment of whoever inserted the episode! The dramatist did not foresee the long line of stalwart and melodramatic Macbeths, who, so far from seeming incapable of military prowess, seemed *chiefly* capable of it, and rather likely to be incapable of qualms and fears and spectral susceptibility. If he had, it would probably have disturbed him almost as much as the sight of Banquo's heirs disturbed Macbeth. What Shakspeare did apprehend was that audiences might not be able to imagine that a man seen so constantly under the influence of ghastly dread could ever have made his way as a general to the position from which Macbeth stepped through blood to the crown. Accordingly he literally overlays the first scenes with accumulated references to Macbeth's bold and successful martial

character in order that doubt may never again arise in any spectator's mind throughout the play.* For my part, those who think that a brave warrior could never contrive base murders, or succumb to the horrid hauntings consequent upon them, must settle their quarrel with Shakspeare. Where Mr. Irving is wrong, is in not availing himself of the means Shakspeare has supplied of fixing indelibly on the minds of his audiences that bold soldierly professional bravery,† which, though not, as many think, the basis, was the superficies of Macbeth's character.

There is one peculiarity of the mistakes of great actors which gives them a great advantage over the errors of shallow texual critics. They do not impoverish the drama. On the contrary, they people it with respectable and often grand multiplications of character. The Kembles, and some of their predecessors, are responsible for the setting up of a fictitious notion of Macbeth as a magnificent hero, and of Lady Macbeth as a splendid woman, superior to every access of softness. This conception was deeply founded by Mrs. Pritchard, who played with Garrick, and Mrs. Siddons only carried the conception to a still higher point of feminine magnificence. But all the time the true character stared

* The "Bellona's bridegroom" theory, as I believe it is now called in London, has been challenged before the present debate. It was disputed by Steevens and by a Mr. Whateley, and these critics were spiritedly replied to by John Philip Kemble; but having glanced at these polemics, my impression is that there was a singular inability on both sides to understand the difference between the sort of moral courage required for a life of murder, and the sort that suffices for one of military glory. And, besides, those of the one party as well as those of the other made use of the most fanciful and fribbling arguments.

† "Your husband is extremely brave on the field of battle; but out of sight of the enemy, he is weaker than a woman."—*Napoleon to his sister Caroline, wife of Murat.* Steevens, the commentator, has been much praised for saying and illustrating from "Hamlet," "Othello," &c., that "it is a favourite moral of Shakspeare that crime and a bad conscience make cowards of the bravest." There is much in Shakspeare to support this as a general view. But so far as Macbeth deserves to be called cowardly, he would have been what he was even without crime, wherever and however the choice of good and evil was movingly presented to him.

every reader in the face as he pored over the Shakspearian text, even if it did not lurk in some of the earlier traditions of the theatre. When poor Partridge, in "Tom Jones," saw "Hamlet," he said that if that little man on the stage was not frightened of the ghost, he had never seen any man frightened in his life, and he was quite indignant when it was thought he could prefer Garrick, who looked so scared, to the gentleman who played the king, and who anybody could see was an actor, he spoke all his words so distinctly and twice as loud as Hamlet. From this it would appear that for fine actors to be accused of ignoble physique and elocution is no novelty, and that if the Kembles followed in the wake of similar predecessors, there were at least brilliant exceptions who depended more upon intellect and nature. Garrick, we know, not only played Hamlet as just described, but enacted Macbeth so as to show that, when once excited, he could not conceal the emotions of his soul, even in the presence of Duncan.

Whether the magnificent or Kemble view is right or wrong — whether any acting interpretation which gains acceptance is right or wrong — matters comparatively little. These readings do but multiply the springs of dramatic enjoyment, and when, after exercising the public mind in a certain ideal direction for a certain period, they are corrected by truer conceptions, they leave beautiful traditions to garnish the imagination, and also continue for some time on the stage to afford alternatives for the taste and worthy subjects for critical discussion. To each of the great actors, or great critics who establish dramatic conceptions, we may say, as Sainte-Beuve said to certain authors, "We admire you individually, one by one, though we are not of your sect." Criticism should, indeed, be as catholic as religion, and the less we are able to subscribe to each other's dogmas, the more eager should we be to step out of ourselves into sympathy

with the particular aspects of the beautiful by which each preference is inspired. Far otherwise must we regard the confident mutilations of presumptuous textualists. They rarely purge the work they prune; and they banish into an obscure exile of doubt and discredit many passages that should not lightly be lost.

With one of the suggested excisions, however, I could find it in my heart to agree, if it were only a question of our personal enjoyment in the nineteenth century. The speeches of Hecate appear grossly unworthy of the poet, and, because she is really a supernatural being, they prevent, what would be very acceptable, a rationalising interpretation of the seemingly supernatural in the play. Are not the speeches of the witches equally unworthy? And do they not equally require the *bonâ fide* acceptance of the supernatural? Assuredly not. Gervinus is greatly mistaken in assuming the universal unreality of Shakspeare's spirit-world, and in supposing that none of his apparitions are visible except to persons of over excitable imagination. There is this great difference, for instance, between the supernatural in "Hamlet" and the supernatural in "Macbeth." In the former, the ghost cannot be an illusion of Hamlet, for it has been seen by Horatio and the officers of the guard. But in "Macbeth," no person of the drama, not even Macbeth himself, sees anything that might not have been contrived in the border world which in the days of witchcraft was inhabited by those who dabbled in destiny and traded upon the popular appetite for the marvellous and malign. That Macbeth, in his self-absorbed, illogical way, believed in the preternatural character of what he saw and heard is clear, and therefore the moral interest of the picture of a man acting under such instigations is safe, and cannot be disturbed; but if Hecate were out of the play, and Banquo's ghost allowed to be, as it well might, a spectral illusion, the incredible would be got rid of, while the poetic

standard of the play would be raised. The Rabelaisian recital of the ingredients of the witches' broth, their wild manner of life, and their own evident faith in their sorcery would remain, but such *quasi* sincerities may be paralleled in the history of all impostures. Psychology has never precisely drawn the line where even in the same person honest superstition ends and politic contrivance begins; and it is difficult to believe that, in a practically Manichæan age, the dreaded representatives of the powers of evil would not use their influence deliberately and by concert for any object they might choose to promote.

The strongest argument against a rationalising view, apart from Hecate, is the correspondence between the cutting down of branches in Birnam Wood to mask the approach of the troops, and the strange manner of Macduff's birth, with the juggling prophecy by which Macbeth was braced for his last struggle with fate. But we all know that if we rationalise at all, we must allow a great deal for coincidences; and these coincidences are not more striking than many which are recorded in connexion with the old oracles.

All such speculations are idle, however, unless Hecate's principal speech is spurious, for she appears amongst the witches undoubtedly in a supernatural character. Yet even here it would be rash to cut out any of the text. Shakspeare used to purchase the privilege of delighting himself and a higher class of his hearers by very ample condescensions to the million. Even when condescending, he could not help being often great, but he did condescend; and in this instance, if he himself deemed it worth while to rationalise, as he very likely did not, he, no doubt, thought that Hecate was but a little further concession to the vulgar than the witches, though the latter are at once credible and weird, while their mistress, as represented in his play, is neither true nor impressive.

What we want in such matters of criticism is efficient common sense. Shakspeare has been excitedly represented in almost every light but the true one. To one writer he is a lawyer, to another a Catholic, to another a Tory, to another a gentleman, to another a land-surveyor—and so on. They all forget that he was a theatrical manager, who made a fortune. Whether this lowers our idea of Shakspeare or not is of little consequence, for there is no getting out of the fact. It need not much degrade our estimate of his work. Although a successful theatrical manager, he was also a playwright, and he was also a poet. He did not commit, for the sake of success, any unpardonable sins, and the sins he did commit leant much to virtue's side in wit and humour and character. For my own part, I could spare Hecate very well, and I like to fancy the play without her. But who knows what others may see in her speeches? If Shakspeare were here, perhaps he would say, "You are quite right, she is an excrescence. But she has been before the public a long time. You can rationalise in spite of her. Be thankful that you have got rid of Davenant's singing witches, and, for auld lang syne, let Hecate—who is really mine, though I am not proud of her—remain."

If we are to make anything of Shakspearian criticism we must understand to the full how frankly and practically Shakspeare did his work. He was not a regularly educated man, but, as Matthew Arnold says, he lived "in a current of ideas in the highest degree animating and nourishing to the creative power," in a "society permeated by fresh thought, intelligent and alive"—a "true basis for the creative power's exercise," in which "it finds its data and its material truly ready for its hand." And he used not only the ideas which he imbibed as they floated around him, but all the learning he could pick up without neglecting his calling. The mere literary man is rarely a profound scholar, but there is no

reason why he should avoid every touch of classics as if Dr. Busby were on the look out to birch him for a false concord, or as if Mr. Robert Lowe were waiting round the corner to cudgel him into his proper domain of common knowledge. There are two sorts of partially educated literary men, and genius has been found in each. A Dickens, partly from honesty and partly from morbid self-consciousness, will avoid, from the first line of his works to the last, any seeming acquaintance with the learning which is rarely got out of the regular University groove. A Disraeli, on the other hand, though he knows better than to attempt to cap Virgil with Mr. Gladstone, can, on occasion, cite a line of Claudian more apt and to the purpose than any of the ordinary stock quotations with which it is an old fashion for double-firsts to recreate themselves.

And so with Shakspeare. To pretend that he had recondite views of this or that race or this or that period to set forth is nonsense. There was no such stuff in his thoughts. There were no such professional subtleties in his programme. But neither did he reject knowledge, or avoid dramatic subjects, which more scholarly men think their own. He undertook anything he thought he could manage, and he was never altogether mistaken. He read as much as he had time for, and, with or without suggestions, imagined "moulds of fancy," as Hazlitt said, which "springs of pure feeling" rose and filled. This was his easy and happy way of going to work; and we must understand it. Because Shakspeare has become a text-book for Universities we are not to suppose that he is by any scholastic standard a classic. He and his contemporaries would have been amazed at such a prospect, though now, if we wanted to redefine the classical, it might be necessary to devise a formula by which Shakspeare would be included. The best of him and of his method is, that there is no straining, no avoidance of certain topics, other-

wise eligible, as lacking in dignity. He reaches heights of majesty, compared with which those of Æschylus himself may almost be called poor and provincial, but it is without effort. He uses no inflated balloons of artificial sublimity. His characters are not demigods. He dares to tell us that his most refined hero was fat and scant of breath. If you are to understand either Hamlet or Macbeth, you must banish from your minds the predominating notion of physical and manly perfection which attaches to the personages of Greek tragedy. It is irrelevant and misleading, however firmly the Kemble and Siddons school may have established it. Shakspeare seems positively to have taken pains to exclude it, and to show how differently he estimated the atmosphere in which it is the genius of our nation to produce poetical works of art.

In truth, however, classical elevation was even in classical times a matter of degree. The most classical dramatists have come short of the antique ideal. This was inevitable. There was once a Spanish hidalgo, who, in going along a muddy street, nose in air, had a great fall. As he picked himself up, with all the native grace of a patrician, he haughtily remarked, as if instructively apologising to the awed bystanders, "This comes of walking on the earth." Human dramatists, however Olympian, must walk on the earth. This necessity was always experienced. Mr. Grote tells us that while Æschylus threw around the gods an airy grandeur, even his men did not appear tenants of this common world. It was to the extinct heroic race which had fought at Troy and Thebes that his conceptions aspired, "and he was even chargeable with frequent straining, beyond the limits of practical taste, to realise his picture." But even Æschylus, as Mr. Grote also points out, did not consistently succeed, "because consistency, in such a matter, is unattainable, since, after all, the analogies of common

humanity, the only materials which the most creative imagination has to work on, obtrude themselves involuntarily, and the lineaments of the man are thus seen even under a dress which promises superhuman proportions." If to promise and not perform is as bad in art as in life, we may be thankful that the artificial standard of Æschylus was soon abandoned. Euripides was taunted by Aristophanes as a representative of young Athens, and was accused by pedantic critics of "vulgarising the mythical heroes, and transforming them into mere characters of common life."

Of course, it must be well understood that there were, in the case of Euripides, other modifying circumstances at work than the mere preference for being natural. A transition from the lofty height of Æschylus had already been commenced by Sophocles, who, though adopting a higher standard than that of actual humanity, was always decidedly and exquisitely human; and Euripides appears to have had a special *animus* in pushing the change still further. This is well stated by August Schlegel. "It was by no means his object," says that critic, "to represent the race of heroes as towering in their majestic stature over men of his own age; he rather endeavours to fill up or to build over the chasm that yawned between his contemporaries and that wondrous olden world, and to come upon the gods and heroes in their undress. . . He introduces his spectators to a sort of familiar acquaintance with them. He draws the supernatural and fabulous," not "only into the circle of humanity . . . but within the limits of the imperfect individuality." Manifestly, ideas were at work here, and changes were being made which fall within the domain of ancient religion rather than that of modern criticism, and of the benefits of which we are only very indirect inheritors. Moreover, it would be in the highest degree unintelligent to repudiate any noble form of dramatic poetry. We may even admit, if we are

constrasting Shakspeare with Æschylus, that our great dramatist is open to a just criticism passed upon Euripides, to the effect that he is very unequal, and that he occasionally sinks from passages of overpowering beauty into downright mediocrity. Still there is an aspect of this old question between moral classicism and moral realism which cannot be dispensed with in this discussion.

It has been pronounced that, "on the whole, the stern monotony of construction brings 'Macbeth' nearer to the Greek type than anything else of Shakspeare's." And the critic who made this observation went on to say that Shakspeare is even more severely simple than his nearest Attic parallel. He compares Lady Macbeth with Clytemnestra, and points out that "the 'Oresteia' is infinitely more complex than 'Macbeth' in its leading motives. Clytemnestra has had great wrong, and her crime does not wholly cut off sympathy. The avenger of her deed is crushed between opposing duties. To strike and not to strike is a sacrilege, and only the council of the gods can at last undo the knot of fate. In 'Macbeth' there are no such doubts. The murder of Duncan is a crime of mere vulgar ambition, without any shadow of excuse or pretence of higher purpose, though the poet might have easily found some. The overthrow of the usurper is as clearly righteous as his power was wrongful. His rule is a tyranny unredeemed by any touch of nobility. The golden opinions he formerly won in loyal service have vanished without leaving a trace. All this," continues the critic, "does not seem quite natural. It may be, however, that the interest is intended to be not natural, but supernatural. Grotesque and absurd as the machinery of the witches now appears to Shakspeare's audiences, if not to Shakspeare himself, witchcraft was a perfectly real thing. The witches probably represented supernatural influence, which is to be thought of as

pervading the whole action. Thus the parallel to Greek tragedy is not a superficial one." The points of this thoughtful, though rather crude critique, will in effect be reviewed before I have done. But at present I use it in order to introduce a sketch-contrast, rather than a comparison between the "Oresteia" and "Macbeth."

The subject of the former is the murder of Agamemnon, on his return from the Trojan war, by his wife, Clytemnestra. The action is thus admirably described by Schlegel, from the point at which the king reaches home. "Agamemnon arrives, borne in a sort of triumphal car, and, seated on another laden with booty, follows Cassandra, his prisoner of war, and concubine also, according to the customary privilege of heroes. Clytemnestra greets him with hypocritical joy and veneration. She orders her slaves to cover the ground with costly embroideries of purple, that it might not be touched by the foot of the conqueror. Agamemnon, with wise moderation, refuses to accept an honour due only to the gods. At last he yields to her solicitations, and enters the palace. The chorus then begins to utter its dark forebodings. Clytemnestra returns to allure, by kindly speeches, Cassandra also to destruction. The latter is silent and unmoved, but the queen is hardly gone when, seized with prophetic furor, she breaks out into the most confused and obscure lamentations, presently unfolding her prophecies more distinctly to the chorus. In spirit she beholds all the enormities which have been perpetrated within that house—the repast of Thyestes, that the sun refused to look upon; the ghosts of the mangled children appear to her on the battlements of the palace. She also sees the end which is preparing for her lord, and, though shuddering at the reek of death, as if seized with madness, she rushes into the house to meet her own inevitable doom; while from behind the scenes we hear the groans of the dying Agamemnon.

The palace opens, Clytemnestra stands beside the body of her king and husband; like an insolent criminal, she not only confesses the deed, but boasts of and justifies it, as a righteous requital for Agamemnon's sacrifice of Iphigenia to his own ambition. *Her jealousy of Cassandra, and criminal connexion with the worthless Ægisthus, who does not appear till after the completion of the murder, and towards the conclusion of the piece, are motives which she hardly touches on, and throws entirely into the back-ground. This was necessary,*" says Schlegel, in all the good faith of classical enthusiasm — "this was necessary *to preserve the dignity of the subject,* for indeed Clytemnestra could not with propriety have been pourtrayed as a frail seduced woman. She must appear with the features of that heroic age, so rich in bloody catastrophes, in which all passions were violent, and men, both in good and evil, surpassed the ordinary standard of later and more degenerated ages. . . . Moreover, by bringing the sacrifice of Iphigenia thus immediately before us, the poet has succeeded in lessening the indignation which otherwise the foul and painful fate of Agamemnon is calculated to awaken. He cannot be pronounced wholly innocent. A former crime recoils on his own head. Besides, according to the religious idea of the ancients, an old curse hung over his house. Ægisthus, the author of his destruction, is a son of that very Thyestes on whom his father, Atreus, took such an unnatural revenge. And this fateful connexion is vividly brought before our minds by the chorus, and more especially by the prophecies of Cassandra."

The contrast I desire to draw has probably occurred to every listener. Grand as all this may be, how limited is its moral interest — how frustrated by unnatural rules and pompous punctilios of art — how false and traitorous to reality in order to be classical. Do we not all see that if Æschylus in fetters could make a grand tragedy out of a

mutilated and falsified subject, he would have made a grander if he had been as free as Shakspeare, and his theme as realistic as Shakspeare's story of Macbeth? If Clytemnestra was not too splendid to fall, why should her fall be too mean for tragedy? If she was jealous of Cassandra, why should the poet ignore so powerful a motive? If she loved and sinned for the sake of possessing Ægisthus, what is there fine in pretending that the strongest, and in her most irresistible, of passions had no sway over her conduct? Why is it magnificent to pretend that she slew her husband because he had sacrificed Iphigenia? What profit is there in such pretences? Above all, is it not frivolous, rather than tragical, to fasten all these horrors on an hereditary curse, instead of making them the moral outcome of ungoverned passions?*

Again I acknowledge that criticism should be catholic. Again I guard against the supposition that any great production of art, the highest in its own age, is to be rudely challenged or unconditionally condemned. Not in a line would any of us alter the sublime Greek play. But we have a right to resist the encroachments of obsolete classicism when we find it foisting upon us a false "Macbeth."

This has been done, done by high authority and example, done so effectually that to this day the ideal so established governs the taste of most playwrights and the pens of most critics. You may look in vain into Schlegel for any adequate characterisation of "Macbeth." On the sublime side he is loud and lofty enough. He tells us that nothing so grand has been written since the Eumenides. He lauds the stern rapidity of the action, "as if the drags were taken from the wheels of time, and they rolled along without inter-

* It is a wonder the whole story of Macbeth has not been sapiently traced by some classicist to the suggestion that Lady Macbeth's first husband and her only brother were slain by Malcolm II., Duncan's Grandfather.

ruption in their descent." His fancy is justly struck by the energy of an heroic age, seen in every feature—"an energetic heroic age in the hardy north which steels every nerve." And he bears witness that nothing can equal this picture in its power to excite terror—"the murder of Duncan, the dagger that hovers before the eyes of Macbeth, the vision of Banquo at the feast, the madness of Lady Macbeth; what can possibly be said that will not rather weaken the impression these naturally leave? Such scenes stand alone, and are only to be found in this poet; otherwise the tragic muse might exchange her mask for the head of Medusa." With all this every reader must agree, nor is it the limit of the great German critic's discernment. He stands up wisely for the realistic vulgarity of the witches, and rebukes a poet of his own nation, who had rewritten their parts to make them sublime. But he loses his cunning when he comes to the ethical aspects of the play. Natural motives, he says, seem inadequate to account for Macbeth's first crime, and he assumes that Shakspeare had some classical or æsthetic object in not representing Macbeth as a hardened villain. The object of the dramatist was, according to Schlegel, a sublimer one. Here I venture to interpolate that no one will ever understand the ethics of Shakspeare (and without understanding his ethics you cannot understand his plays) who is perpetually expecting or supposing him to be sublime. His heroes reach great heights of sublimity, but they cannot be *depended upon* to be sublime any more than they can be depended upon to be logical.* Shakspeare recognised no such requirement. Those who best understand him will enter into no such contract on his behalf. Human his characters must always

* A great dramatist, when he has proved his greatness, is not to be too hastily arraigned for inconsistency in his characters. We have to stand before them as before undoubted creations. They are men and women almost as much as the men and women whom God has created, and if we are honest and observant, we shall admit that they are not more puzzling.

be; human even when acting under supernatural instigation; human in every incident and relation; consistent, *perhaps;* sublime, sometimes. This greatest of dramatists knew his kind and his craft too well ever to remain long on the stilts. Of this Schlegel was only partially conscious, and unhappily his criticism has settled and given literary sanction to the exclusively sublime theory which the long and absolute reign of the Kembles brought into vogue.

His Macbeth is "an ambitious but noble hero,* yielding to a deep-laid hellish temptation." All the subsequent crimes to which the usurper is driven by necessity "cannot altogether eradicate the stamp of native heroism." His wife instigates him to commit the deed which the witches have suggested, "urging him on with a fiery eloquence, which has at command all those sophisms that serve to throw a false splendour over crime." "Little more than the mere execution of it falls to the share of Macbeth; he is driven into it in a tumult of fascination." "Repentance immediately follows, nay, even precedes the deed, and the stings of conscience leave him rest neither night nor day. But he is now fairly entangled in the snares of hell," and this—not any native characteristic of the man—makes him "cling with growing anxiety to his earthly existence the more miserable it becomes, and pitilessly remove out of the way whatever to his dark and suspicious mind seems to threaten danger."

I read such an account of the play with a sensation of amazement, confusion, and absence of recognition, which I should think resembles incipient paralysis. I feel as Lady Teazle must have felt when dumbfounded Mr. Surface gave Sir Peter that wonderful explanation of her being caught behind the screen in his library. The play does not support a single line of Schlegel's imaginative description of its motive. "Not one word, Sir Peter." The whole of it must be traversed.

* Hazlitt goes further, and calls him "frank, sociable, and generous."

To begin, Macbeth had conceived the murder before he met the witches. This is proved by the language of his wife when Duncan was in the house:—

> What beast was't then
> That made you break this enterprise to me?
> Nor time nor place
> Did then adhere, and yet you would make both.
> They have made themselves, and that their fitness now
> Does unmake you.*

Lady Macbeth did not quite understand her husband, but she understood him a great deal better than modern critics who take him for a hero. So strong-nerved and determined a woman, who would have scorned to contemplate a villainy she dared not commit, could not be deceived in the signs of cowardice which her husband so plentifully exhibited. She knew him to be brave in the field—as many a moral coward has been before and since. She was even persuaded—wrongly—that if he were once crowned, he would be able to "keep his state" with a sufficient outward show of callous majesty. But she recognised the weak place in him, and saw that she must keep him to the sticking-place. This, rather than primary instigation, was her function, and the necessity of it lay in the inherent baseness of Macbeth, who could neither be an honest man of valour, nor a valorous man of sin.†

* Macbeth not only is proved to have broached the project of destroying Duncan to his wife before going to the campaign, but receives, with a more than natural display of emotion, the prophecies of the witches on the heath, and as soon as one of these predictions has been verified thus soliloquises:—

> My thought, whose murder yet is but fantastical,
> Shakes so my single state of man that function
> Is smothered in surmise.

† Strangely enough Coleridge goes out of his way to explain all this by treating the whole of the mental anxieties of the pair as purely appertaining to conscience. He asserts that Macbeth "mistranslates the ominous whispers of conscience into prudential and selfish reasonings, and after the deed done the terrors of remorse into fear from external danger; like delirious men who run away from the phantoms of their own brains, or, raised by terror to rage, stab the real object that is within their reach." I can only say that this seems to me super-subtle. I can imagine no reason for diving so fallaciously below the plain meaning of Shakspeare's words, and there are abundant reasons against it.

At first Lady Macbeth took a too favourable view of her lord's weakness. Some husbands show their wives only the best sides of their vices, as others show them the worst sides of their virtues, and it is a proverb, that many a spouse thinks well of her partner long after every one else has given him up. Such facts are quite beneath the notice of critics who cannot descend from the fixed stars of perpetual sublimity; but Shakspeare had a keen eye for them. When Macbeth had already confided to his consort his heroic idea of murdering the king—which, as he then proposed to make the opportunity, was the first and last heroic idea we know him to have had—and when she had thereafter received a letter from him telling the story of the witches, she thus charitably apostrophised him:

> Glamis thou art, and Cawdor, and shalt be
> What thou art promised: yet do I fear thy nature;
> It is too full o' the milk of human kindness
> To catch the nearest way: thou wouldst be great;
> Art not without ambition, but without
> The illness should attend it; what thou wouldst highly
> That wouldst thou holily; wouldst not play false
> And yet wouldst wrongly win; thou'dst have, great Glamis,
> That which cries "Thus thou must do if thou have it;"
> And that which thou dost rather fear to do
> Than wishest should be undone.

So far as this is a picture of Macbeth's infirmity of will, it is a true one; so far as it attributes that infirmity of will to generosity of nature, it is unsupported by anything else is the play, and indeed will be found on close examination to break down in the very passage itself. Yet it is often quoted as a proof that Macbeth's was a noble nature until spoiled by the witches and by his wife. I prefer the theory that Lady Macbeth, who loved her husband as strongly as she was determined to make him great, although she knew his weakness, held a too favourable view of its origin, and that what she

took for the milk of human kindness, was really the white feather. The very discrepancy between the man's undoubted and quite comprehensible weakness as presently revealed, and her complimentary way of explaining it, is full of significance most destructive to the amiable and heroic theory of his character.

If Shakspeare had intended Macbeth to be a noble and generous man led astray, nothing could have been easier to him, and the picture would have been a fine one. But that which he has given us, if less imposing, is not less interesting as a moral study. Take the speech at the beginning of the seventh scene. Surely at that moment a hero, and a well-disposed man, with his aged king under his roof-tree, would have felt compunctions other than selfish, and there is a passing reference to the circumstance that Duncan as a guest was there in double trust. But the mean villain is not seriously impressed by this. He is troubled by other matters. The probability that one murder will not suffice frets him. He says, if one murder would serve, he would not mind risking the life to come. But, unfortunately, retribution comes in this life. A cruel man in high place finds his example come home to him to plague the inventor. Besides, king Duncan has been so amiable and exemplary that every one will bewail his loss and execrate his taking-off. On the whole, therefore, the willing murderer does not like the look of things. This noble hero finds his project so likely to make him unpopular, that he really wishes he had something besides ambition to urge him on. If Duncan had only insulted one, now, or even been ungrateful, instead of loading one with honours, how comfortably one could murder him! But it was a bad world for Macbeths in those days, as it is for William Sikeses in this. Nothing went right. The king this "misled but virtuous hero" particularly needed to be rid of was so respectable and kindly that it could not but be a

disgrace to kill him. Such are the sentiments of this speech, and they are again and again exemplified. When Macbeth has had Banquo assassinated, he gives himself the airs of an injured man because the ghost appears at the supper table. "Blood hath been shed ere now," he says querulously, "and when the brains were out the man would die, and there an end; but now they rise again and push us from our stools. This is more strange than such a murder." That ideas of this sort are expressed in glorious poetry does not alter them. They are as base, cowardly, paltry, as they are heartless and devoid of all sense of true repulsion from evil.

Ugly as the business looked, when Duncan had arrived at the castle, Macbeth did not care to drop it, and he well knew his wife would not allow it to be abandoned. Accordingly, he gave her the cue for such stimulating arguments as would best meet the case, by proposing that they should proceed no farther. Duncan had honoured him. He had bought golden opinions from all sorts of people, and these should be worn in their newest gloss, not cast away so soon. A very proper reflection, though not quite in the tone of a good man shrinking from a detestable action. Lady Macbeth answers him — answers him powerfully — answers him unanswerably. But how? Schlegel tells us she uses the sophisms that throw a false splendour over crime. Nothing could be more untrue. She uses no sophisms at all — either here or in other passages. I beg you, for we are now at the heart of the matter, to give your most attentive hearing to the argumentative part of Lady Macbeth's share in this conversation. "Was the hope drunk," she says —

> Was the hope drunk
> Wherein you dressed yourself? hath it slept since?
> And wakes it now, to look so green and pale
> At what it did so freely?

An admirable metaphor this: bold, realistic, and to the

purpose; appropriate to the moment and the scene, while the coarse revels of a half-barbaric castle during a royal visit were actually audible, as these two debated the miserable issue on which hung the life which of all others in the world they should have held sacred. "From this time," says Lady Macbeth, knowing her power over her husband, and probably seeing that her apt, rough simile has seized upon his quick imagination—

> Such I account thy love. *Art thou afeard*
> *To be the same in thine own act and valour*
> *As thou art in desire? Wouldst thou have that*
> *Which thou esteem'st the ornament of life,*
> *And live a coward in thine own esteem,*
> *Letting "I dare not" wait upon "I would,"*
> *Like the poor cat i' the adage?*

If this plain speech needs a paraphrase, and perhaps it may, for Dr. Johnson said it contained no argument, it should run somewhat as follows:—"Come," says the wife, "no sentiment, no harking back, and no cowardice! Duncan had been just as good to you yesterday. If there were any sound reason of policy why you should give up the idea of murdering him, you would state it. But you do not. You merely lack courage to do what you desire. Surely you are not so poor a creature as to prize the esteem of men without deserving it! Surely it is better that men should hate you in a proud position, resolutely won, than that you should despise yourself in a lower position, in which you remain, not from virtue, but from cowardice. If you were a good man, and had religious scruples — if you were a humane man, as I used to think you, and shrank from cruelty as cruelty — I could understand your objecting. But this mere quaking, without any principle in it, is beneath contempt."

> When you durst do it, then you were a man;
> And, to be more than what you were, you would
> Be so much more the man.

Then Lady Macbeth — her mind fixed solely on her one principle, that if you are not prevented from perpetrating evil by scruples it is contemptible to be hindered by mere fear or irresolution — bursts into the celebrated rhapsody in which she describes how remorselessly she would have slaughtered her babe if she had sworn to do it. This produces a very slight effect on her husband. When she asked him whether he was content to live like the poor cat i' the adage, he threw out one of those obvious light outworks of morality which are prompt enough in most of us as extempore defences against temptation — a line and a half which Dr. Johnson said must make Shakspeare immortal if all the rest of his works perished: Who dares do more than becomes a man is none. But this is soon forgotten. While his wife has been talking of dashing her infant's brains out, his mind has lit on the one point that is practical. "If they should fail." And then comes the most significant incident of all. As yet Macbeth has not got the dram he needs. His wife's bold moral theory does not stimulate or assimilate with his mean instincts. He is just as little inclined either to deserve or to lose the world's esteem as ever. He is not screwed to the sticking-place. *What happens?* Lady Macbeth hints at the plan of putting the murder upon the drunken officers of the king's bed chamber. In a moment her husband — this highly moral and noble character, whom only supernatural solicitings and a bad wife can bring within sight of an evil project — is all agog.

> Bring forth men-children only;
> For thy undaunted mettle should compose
> Nothing but males.

With wonderful quickness he improves on his wife's dastardly suggestion :—

Will it not be received,
When we have marked with blood those sleepy two
Of his own chamber, and used their very daggers,
That they have done't?

LADY MACBETH.

Who dares receive it other,
As we shall make our griefs and clamour roar
Upon his death?

These happy thoughts are quite sufficient for the virtuous Macbeth. He is almost as comfortable as a man can be who is bent on a desperate criminal enterprise, with hardly "virtue enough to be faithful to his own villainy." "I am settled," he cries,

and bend up
Each corporal agent to this terrible feat.
Away and mock the time with fairest show:
False face must hide what the false heart doth know.

After this, I must say that it seems to me too bad that it should be levelled at any actor as a reproach, that he makes Macbeth craven and abject. What is the man else? What greatness has he except in the field — in vivid eloquence — and in a desperate death at bay? It is no weakness indeed to shrink from crime. To recoil from a misdeed which promises wealth or power is to many a nature a task requiring vast strength of moral principle. No one would call Macbeth a coward for being horrified at the thought of murder. To break into the human temple and steal the life of the building must always be indescribably horrible. There is no image that any of us can conjure up that more thrills our own moral sensations, though we may be barely able to conceive the feelings of a homicide. But Macbeth was meanly wicked, because his mind did not revolt from the deed, but only from its accompaniments and consequences.

At the same time, it must be confessed that in these two scenes, in which the character of Macbeth is fixed, the representation of Mr. Irving — which has been severely censured as too craven — does not exactly bring out the idea of the text. I hesitate to take objection lightly to anything in that wonderful performance, because it is superior, with all its faults, to any other that I have seen, and because I shrink from seeming to be amongst the crowd of empty depreciators by whom the steps of original greatness are always dogged. But in order to distinctly mark the true Macbeth, the new Macbeth must be rigidly as well as sympathetically scrutinised.

Now it seems to me that while Irving has most truly and firmly caught the character of Macbeth, he has not quite so successfully apprehended Shakspeare's method of displaying that character. Shakspeare depends more on light and shade. Irving relies too much on a prevailing dun colour. His first scene is faultless. When the dim rocks of the witch-prelude have vanished, and the heath is revealed, upon which the returning generals meet the imperfect speakers who prophesy their fortunes, Macbeth enters on a rising ground, and the striking profile of the actor is seen clear-cut against the murky sky, as he gazes with the keenness a great general never quite lays aside across the gloomy country. He turns to the audience, and in a single gaze, as in "Hamlet," fixes the character of his whole performance. Is this right? It would not be if Macbeth were, according to the received notion, the amiable tool of a wicked woman and an irresistible destiny. But it *is* right, because the dramatist has given the actor the means of knowing before hand the restless, acquisitive moral nature that lives within Macbeth's warlike exterior. As he stands there in clear outline against the lurid sky, no one could fancy him an ordinary successful general on his way home from victory to

honour. There is more in him, and the overplus is high-reaching, gloomy, and mischievous. Such a disposition, insatiably ambitious, fretful over the need to do ill deeds in order to satisfy unbounded desires, but never genuinely turning away from a temptation that promises advantage, is tinder for the sparks of the witches' promptings to fall on. At the first contact the glimmering tracery of evil suggestion flits and flutters through Macbeth's being. Honest Banquo —too little regarded by lovers of the play, one of the finest examples in poetry of unsmirched and unsmirchable honour in a mind quick to comprehend inducements to evil and to note the yieldings of others to brilliant temptation — honest Banquo sees almost every thing that is passing through his colleague's mind. There is very little secret about it. Before he meets the witches Macbeth has thought of murder. From the moment when they call him king he dwells on murder. From the instant when, being greeted Thane of Cawdor by the king's messenger, he has earnest of the fulfilment of their weird prophecy, he *means* murder.

There is really nothing gradual in Macbeth's villainy, except as bloodshedding begets an appetite for more. His wife screws him up to it in the first case of Duncan, but she is only the lever; the screw is in his own mental machinery. By and by, when he groans that Banquo and Fleance live, she faintly returns to her old strenuous prompting way, though she is already sickening at the expanse of blood into which they have waded; but Macbeth has anticipated the suggestion, has even made his arrangements, and the murderers are already on the track of his innocent victims. Yet this prompter Macbeth, though grown stronger in deed, is the same in heart as the wilful murderer who received the witches' "All hail" at the head of his army. And this unity of character it is Mr. Irving's constant purpose to conserve.

But the bow should not always be bent, and the Macbeth

of the scene with his wife in which the project is discussed would better illustrate the uniform worthlessness and selfishness of this murderer on principle if the gloom were lifted a little. The air of abstraction which Irving wears on the heath is maintained in all companies. His Macbeth makes but the faintest and most ineffectual attempts to bear himself like other men, even when he receives the king's thanks, and afterwards when the robes and ceremonies of monarchy might seem to call for more conventionality of manner. There is a meaning in this. The actor probably intends to indicate his perception of what is plainly written in the play, Macbeth's absolute dependence on tyranny, spies, and murder, and his independence, with these weapons in his hands, of all the more delicate resources of policy. The idea is carried a little too far, however, in King Macbeth's public appearances; and so also Irving's unrelieved gloom and abstraction in the important debate with Lady Macbeth undoubtedly weakens the very impression that he desires throughout to produce. Instead of springing, as the text requires, to the suggestion of throwing the murder upon the grooms, Irving's Macbeth seems too incurably weak to get all the practical comfort out of the suggestion that his wife does, though he is also too much himself in his *role* of an ambitious, practical murderer not to appreciate the value of it as a means to an end. There is none of the unscrupulous freshening of his spirits, which one perceives in reading the passage. The power and intention of the actor comes out, not there, but in the succeeding words. Macbeth goes off with his wife, saying, in a half vacant, half desperate manner, that the false face must hide what the false heart doth know. And here, no doubt, in this one line of the exit speech, he takes the right tone. You feel as you look at him that his face will never be false enough to hide his trouble, and that Lady Macbeth will have

the intolerable responsibility of keeping up a curtain of fair show before the horrible realities which will presently and for long years be the basis of their greatness.

With this deeply reflecting actor, it is often in another scene than that in which they occur that the words of any particular passage receive their finest illustration,* and it is in the dagger and actual murder scene that we perceive the profound meaning which in a man of Macbeth's mould lay in his previous undertaking to "bend up each corporal agent" to his "terrible feat." According to the notions which seem to prevail amongst a majority of critics, any such effort should be unnecessary. If he were going to battle, and were in danger of immediate death, his corporal energies would need no bracing; why should noble Macbeth become physically unstrung at the task of killing a weak old man in his sleep? Shakspeare knew better, and Irving, as was said of him in Hamlet, "will not go out of the character." As he enters alone, and begins to follow the dagger in the air which — significant phrase — marshals him the way *that he was going*, I can compare his gait to nothing but that of a sick man roused from his couch and feebly staggering to his feet amidst the swayings of an earthquake. As at length he creepingly approaches the door of the king's chamber, at the words "Thou sure and firm set earth," his feet, as it were, paw for the ground, as if he were walking with difficulty a step at a time on a reeling deck. When he returns, after

* Sometimes there is great strength in his abstention from usual effects. For instance, all previous Macbeths have, I think, made a great point by a complete change of manner at the words, when Banquo's ghost vanishes,

Why so,
Being gone, I am a man again.

Mr. Irving, on the other hand, delivers these words in the anxious tone of a man who ought to feel relieved, but in truth does not. This is much truer. It may probably be taken as a rule that sudden absolute changes of manner which leave no trace of the previous tone of feeling are unnatural and melodramatic, *except where there is an entire change of the material circumstances;* and even then are not always true to life.

committing the murder, we see at once, if we are calm enough, what Irving has added to the achievements of his greatest predecessors in this scene. Hazlitt — whose comments on Macbeth are not altogether worthy of him — said of Edmund Kean, that he left it in doubt whether he was a king committing a murder, or a man committing a murder to be king, but that as a lesson in common humanity his acting was heart-rending. "The hesitation," says Hazlitt, "the bewildered look, the coming to himself when he sees his hands bloody, the manner in which his voice clung to his throat and choked his utterance, his agony and tears, the force of nature overcome by passion, beggared description." This must have sufficiently surprised the Kemble school. Irving has partly added, partly substituted, an idea of tremendous physical prostration, essential to the character of one whose bravery all leaves him when he is wickedly engaged. He reels, he totters, he can barely support himself. One fears that he will smear his wife's arms, or stain his own clothes, with the bloody daggers, as he half holds them in a sort of paralytic clutch, with all intelligent gripe and management gone out of his fingers. His very articulation is as if his teeth were loosened and his tongue swollen. He flounders and all but faints in forlorn wretchedness and horror. His body sways as if already hanging on a gibbet. He is slowly dragged off the stage, moaning, more dead than alive.

To understand this it is not enough to feel the situation. We must know the true Macbeth. We must see, as his wife has seen from the first, that he is capable of suggesting and devising crime, but not of insensibility in committing it.

The true Macbeth is a being whom Kemble could not, whom Schlegel did not, comprehend. The true Macbeth lay out of Kean's simple and single-minded range, and was partly missed even by the more metaphysical but still majes-

tic Macready. There is no reason why in his ceremonial public appearances, and when under the eyes of courtiers and soldiers, the true Macbeth should not have a sort of keen-eyed eagle-like stateliness, except at the points where he is "unmanned in folly." But it is of much more consequence that his demeanour, when his character reveals itself in undress, should vividly present the finely distinguished traits upon which Shakspeare has expended the utmost skill of moral delineation. The true Macbeth is neither a generous hero nor an insensate criminal. He is rather a man who, though not devoid of moral feeling, is without operative conscience — a man who, innocent of cruel tastes or malignant resolve to be a villain, is always, and knows he is always, open to the suggestions and invitations of his besetting passion—a man ever ready to meet such cues to wickedness half-way — and not capable, even when racked by fear and misery, of entertaining the idea that moral considerations are to veto any act he considers for his interest.

Of the immense impulse given to such a character by temptations which appear to approve themselves supernatural there can be no doubt. Nor is it less evident that the palpable intervention of diabolical agency adds great grandeur to the conception and action of the play. If I dwell but little on the more magnificent side of "Macbeth," it is not because I appreciate it less, but because that is a part of the truth which both proclaims itself and is constantly proclaimed. The moral meaning of Macbeth has hitherto been less clearly perceived. For instance, Schlegel, in the passage I have summarised, treats all Macbeth's crimes as following of necessity on the first, and as being deeply associated with the temptings of "that being whose whole activity is guided by a lust of wickedness." But why did Macbeth murder Banquo and attempt to murder Fleance? There was no necessary

connexion between possessing the throne and excluding Banquo's issue permanently from it; and besides, the evil ones whom, when it suited him, he so implicitly believed had told him distinctly that the heirs of Banquo should wear the crown. The attack of Macbeth on Banquo and Fleance is inconsistent with the Schlegel view altogether, but it suggests to us — and Shakspeare undoubtedly meant this — that even the most heartily accepted supernaturalism may not greatly divert the course of human conduct, and that when men seem most under the control of circumstances or of religious belief there is a considerable margin left to the human will.

As yet, though we have dived rather deeply into the moral significance of the true Macbeth, we have not gone far from the lines of the story as Shakspeare received it. Let us now consider for a moment what he did when it occurred to him that Macbeth, King of Scotland, would make a good play. I have already suggested that there was nothing of the pedant or philosopher about Shakspeare. He was not a transcendental poet, nor a university scholar, nor a peer or country gentleman devoted *con amore* to the literary art. He had no "views." He had no special objects in reproducing the past, and affected no idyllic or classic mannerisms. He was not a Leighton or a Poussin of the pen, to revive in faithful grandeur or contagious sportiveness the demigods or the fauns of old. He was a working London playwright, who got hold of the best subjects he could, and made the most of them. But although in his occupation a mere literary caterer for a capital, he had none of the small cynicisms or the narrow limitations of that character. He never dwarfed or demoralised his subjects. He let them expand his pinions, and kindle his disposition to soar. Although a practical London dramatist, he possessed and revelled in what De Quincey called "that constitution of

faculties which our English poets have possessed in the highest degree, and Scottish professors in the lowest: such a constitution of the moral faculties as" gave "him an inner eye and power of intuition for the vision and the mysteries of human nature." I love to imagine, therefore, how Shakspeare, as a literary workman, proceeded upon the undertaking which issued so marvellously.

The supernatural element he found ready in the chronicle, but not in the full legendary strength of unmingled myth. We can imagine how that little cloud, the size of a man's hand, rose and swelled into vast misty forms, until it covered the whole firmament of the poet's inspiration. Then, as it cleared fitfully away to give glimpses of the personages of the drama, the mind of Shakspeare would fasten on this or that possibility of contrasted character, and think it out into fair promise of beauty. Thus would be developed the serene individuality, the " unpossessed mind," as Coleridge beautifully says, of Banquo, in the history an accomplice in treason and regicide, in the play the most gallant and honourable of loyal men. But the most fruitful suggestion — and here we must most honour the genius of Shakspeare — was the brief hint that Macbeth's wife egged him on to the murder. This was an opportunity that might easily have been missed, but out of it grew the true "Macbeth," using the word now as denoting the play.

A great bad deed, the step to a throne, is contrived by two persons, and these two man and wife. Two cannot go together unless they are agreed, and it would have been natural enough to make these partners similar to each other. The play would have been just as magnificent, and quite as classic. But Shakspeare never believed in common forms. It was suggestion enough that one of these criminals was a man and the other a woman. He dared to conceive that the woman, if bad enough to concur in a murder, might be much

more practical in the crisis of it than the man. They were husband and wife, and he knew how their natural co-operation might gloss over the horrible character of their undertaking. He knew also how close the wife would cling to her husband in their common guilt, and how whatever succour could be had from an accomplice spouse whose hands were of his colour would be truly his. This, however, in time would fail. Their horrible copartnery would poison their joys, though it might not untune their concord. Almost their last ardent embrace would be that which they took in the first glow of the anticipations kindled by the witches' prophecies. Thenceforward their union might be affectionate, solicitous, profound; but there would be no possibility of husband-and-wifely happiness when once the secret of blood-guiltiness should begin to weigh around their necks as they hung upon each other's.

> Better be with the dead,
> Whom we, to gain our peace, have sent to peace,
> Than on the torture of the mind to lie,
> In restless ecstasy.

We can imagine the dramatist, more rapt over this picture than he had been over the grander foreshadowings of fate and supernatural temptation, tracing with stern yet tender pencil the dreary course of this miserable couple—the architects of their own majesty, the slayers of their own felicity—as together, yet apart, hand-in-hand, and yet with the icy seclusion of individual guilt closing them in from each other, they should drag through the "to-morrow, and to-morrow, and to-morrow," creeping a "petty pace from day to day," the melancholy to-days and yesterdays which "light fools the way to dusty death." How ghastly the sad separate end of the wife, in the inanition of worn-out misery, must have loomed at the end of one dreary vista, a companion tableau to the fury of heroic despair in which the husband

at the dim extremity of the other was, as in the original story, to terminate his life! How sombre the silent sinking of that gaunt, frail form, with heart unsolaced, nay with heart broken, amidst "a cry of women within!" How crashing the fall of that once more martial figure, upon the shards and fragments of his own piercing cruelties, with heart not even touched, with a mind overclouded in the last moments of life by the old, weary, mean perplexity of doing wrong without suffering for it—how to juggle with the fiend and not get the worst of the game!

Even yet the dramatist's marvellous sketch-book was not complete. There were still subtleties to be added—subtleties of which acting can make little, and of which criticism, because they are religious, makes nothing. To me there is nothing more interesting than the distinct line which Shakspeare has drawn between the two bad natures, which he might easily have kept as much alike as they were closely united and co-operative. If his gifts had been those of Robert Browning, and his calling that of an evangelical confessor, he could not have more finely discriminated between two faintly separated types of sinfulness. And yet how simply it is done — with none of our later poet's morbid pother, and none of the spiritual director's didactic unction! A touch here and there suffices: but what touches they are! It is not merely that one nature is strong and the other weak; nor is it that the one more naturally than the other recoils from wickedness. The distinction is that by the woman in her guilt religion is altogether put aside by an act of will, while the man allows its more terrible images and its less lofty considerations to trouble him, although he has irrevocably resolved to do wrong. The woman says — as women will, when they are thoroughly bad — "We are not good, and we know it. We are for this world; for the things of sense; for the life that passes in palaces and ends in royal

obsequies, with an assured succession full in view. Why dwell on thoughts of God and right and hereafter? If we wanted to be pious we should not be murderers. As we are murderers, we should be foolish to occupy ourselves with thoughts that can only be good for good people." The man cannot follow her here. He tries, but fails. Conscience in its proper sense he has none. Probably she has more than he. At any rate, something that passes for her conscience kills her as surely, though as mysteriously, as an uncomprehended cancer. His conscience does not kill him, and would not in a century. It consists only of a sordid dread of consequences. But the religious element is strong in him notwithstanding. It helps to make him an easy disciple of the witches. It binds him to the hopes their incantations yield him, though his bad instincts are too strong for even supernatural forecasts to warn him off any part of the evil path. In the midst of all his evil deeds, religious terrors rise and scare him. He talks of the life to come. He is horrified that he cannot say "Amen" when the grooms who sleep by the side of their murdered master cry "God bless us!" Such an idea would never have been allowed room in Lady Macbeth's mind. She says, "Consider it not so deeply." He weakly asks why "Amen" should stick in his throat when he has most need of blessing. She is prompt with her one recipe for comfort. Neither he nor she has any insidious materialism to fall back upon. She does not pretend there is no hereafter. She scorns sophisms, though Schlegel says they are her usual resort. She knows only one way of doing wrong and being moderately comfortable. You must banish reflection:

> These deeds must not be thought
> After these ways; so it will make us mad.

Her husband has heard a voice that cried, "Sleep no

more. Glamis hath murdered sleep, and therefore Cawdor shall sleep no more; Macbeth shall sleep no more." These names must have struck her imagination, but her will is stronger. She asks, in a matter of fact way, "Who was it that thus cried?" She knows well enough that Macbeth's feeling is justified if everything is to be taken into account, but she limits her view to the mundane practical. "Worthy thane," says she, and the expression seems to be chosen from a dry and unconjugal vocabulary for the occasion—

> You do unbend your noble strength, to think
> So brain-sickly of things. Go, get some water
> And wash this filthy witness from your hand.

And so on, through the scene. Her constancy never leaves her unattended, because it is against her principle to be troubled by supernatural matters; because, having made up her mind to do wrong, she would think it childish to expect the comfort of doing right.

There is a fine suggestion of this in Miss Bateman's reading of the letter on Lady Macbeth's first entrance. Most Lady Macbeths have read with unbounded exultation the sentences in which are recited the prophecies of the witches; Miss Bateman reads them with interest indeed, but with comparative calmness—one might almost say with a shade, though hardly perceptible, of contempt. Such supernatural business affects her but little, except so far as it all points in the direction she is intent on, and may help to bring her husband to do the deed that is to make him all the witches prophesy he shall be. It is true that Lady Macbeth presently bursts out into a magnificent appeal to the "spirits that tend on mortal thoughts," but this is a figure of speech. What she wants is not supernatural assistance, but the unsexing of her nature, the quelling of all "compunctious visitings." She perhaps foresees that it may come to be

desirable for herself to commit the murder, for she calls upon "thick night" to "pall" her "in the dunnest smoke of hell"—

> That my keen knife see not the wound it makes,
> Nor heaven peep through the blanket of the dark,
> To cry, "Hold, hold."

In all this there is no sincere recognition of the supernatural, no recognition whatever of the Divine; and, curiously enough, when the time comes, and she enters the king's chamber, and leaves the grooms' daggers handy for Macbeth to find and use, she is stopped from herself committing the crime, not by one of the religious terrors which horrify Macbeth, but by a little touch of human feeling, such as in natures like hers long survive the true moral sense, and such as in her grand appeal to the "murdering ministers," who, in their "sightless substances, wait on nature's mischief," she prays may be eradicated. This fury, who could have plucked her nipple from her babe's boneless gums, and dashed the brains out—this murderess in all but act, to whom

> the sleeping and the dead
> Are but as pictures—

this scorner of ghostly terrors, who deems them mere "flaws and starts, impostors to true fear"—this firm contriver and relentless instigator of assassination, who dreads of all things that her husband will be too weak to kill his king and guest, and who would gladly save him from the necessity—yet turns away and leaves Duncan peacefully asleep, awaiting death from another hand. Why? Because he resembles her father as he sleeps. Macbeth would have thought as little of this as his wife would have thought of the grooms saying "God bless us."

Both are alike in this, that they do not let such or any considerations really stand in the way of their purposes. And so they go on to their future with this deadly remembrance behind them. It follows closely, clings to their garments, fills their hearts with forebodings, lines and tinges their faces with care. I have taken my illustrations early in the play, where the key-notes are struck, and I cannot follow into later passages, to which it gives fresh interest, the distinction between Macbeth and his wife which I have sought to draw. Enough that they are soon partners in undisguisable misery. Even when Macbeth thinks he is only concerned with the preservation of what he has gained, he is really succumbing to an undefinable oppression of his consciousness; while Lady Macbeth—played according to the latest and best lights—watches, with yearnings which rapidly soften her moral impassibility, the perpetual fatigue and wretchedness in which her husband lives. A profound teaching is involved in the moral and spiritual poverty of their anguish.* It never rises even to the level of remorse. It does not suggest in a single passage the presence of any reforming principle. Nay, it seems to be a doorless chamber, only lit enough to make its wretchedness visible to those within it, with the exit towards good and enfranchisement and regeneration harshly and hopelessly bricked up. The lesson of it is, that repentance may sometimes seem beyond human reach and desire, though many torments of sin may be desolating the heart. In other words, the moral of "Macbeth" is, that to have a conscience—the common gift of humanity—is not enough; that to educate and stimulate the conscience may in many cases be the first duty of man.

* Note the extreme simplicity, the almost unintelligence, of all the sensations of the murderer and murderess—even the most poignant—that are not connected with exigency. There can be no doubt that the second greatest temptation that could be offered to Macbeth (the first being assured kingship) was immunity from the consequences of black deeds.

I know I shall be charged with reducing "Macbeth" to the level of a Methodist tract. If I *reduce* it at all I am open to condemnation, for I profess to describe the true "Macbeth." But if Shakspeare was a Methodist, how can I help it? In this country we are all Methodists, more or less.* We have passed from one Methodism to another ever since the religious sense of our nation was awakened—perhaps ever since Augustine evangelised us with *his* Methodism—perhaps even earlier. As soon as we find that old forms have lost their power over emotion, we get new ones. When all forms seem dead, there appears amongst us a Methodism, such as the Friends', which professes to have no forms. Nothing cures us of Methodism. Even science does not change us, but Methodism modifies science. Our scientific men become quite uncomfortable—not in mean dread of public opinion, but sincerely, emotionally uncomfortable—if they find their theories or guesses have drifted them away from Methodist moorings. Professor Tyndall writes Methodism in the November *Fortnightly*, and Frederick Harrison, the Comtist, pleads for his neo-Methodism, in the *Contemporary* from month to month. It was not likely that so typical an Englishman as Shakspeare would, in the religious region, differ from his countrymen; and if we ask ourselves what is most distinctive in the true "Macbeth," it is not the grandeur or the terror, which the dramatist shares with his Greek precursors; it is his keen analytical treatment of that heart-wrongness which is a main and perpetual subject of English religion and English art.†

* We rarely sophisticate our vices either in fact or fiction. Even the gay Lovelace, inexhaustible in fancy and pleasantry as in enterprise with the fair, never pretends virtuously to himself or his confidants in any disguise. Macbeth never claims to be a "Saviour of society."

† "Of what kind are the moral conflicts in the ancient drama? They are only such as arise from the opposition between different single virtues and duties. Nowhere do we meet with the idea of the moral law itself in conflict with sin,

There have been many attempts to give a short title to this play, and the results have not been encouraging. If, however, I had to describe it as briefly as possible, I should call it a play in which is exhibited, in an action both tragical and supernatural, a conjugal partnership in reckless and homicidal ambition between two persons of differing, yet of equally ineffective, moral sense.

Those who, agreeing with this definition, know the history of the play since it left its author's hands, will agree also that criticism has done little to realise, and that the stage has only slowly approached, the true "Macbeth." The theatre, however, has done more than the critic. When Mr. Samuel Pepys saw "Macbeth," he wrote in his diary that it was "a pretty good play;" and we may be sure that that sensitive and tenacious gossip did not much misrepresent the tone of his contemporaries. Such acting as that of Garrick and his coadjutors first taught English society and English critics the true depth of the play, and then came the period, several times referred to, during which John Kemble and Mrs. Siddons stamped "Macbeth" with noble traditions of preternatural majesty on the imagination, not merely of

and becoming that divine justice which presides over human history, and visits sin upon the sinner. Even that very drama which is most consonant with our sentiments, the *Antigone* of Sophocles, is based upon a collision of separate duties—duty towards a deceased brother, and the duty toward the law of the State. Into such a collision I may be betrayed by fate, without any fault of my own. But I cannot come into collision with the moral law except by my own fault. The feature which makes Shakspeare a Christian dramatist is, that he refers all conflicts to such voluntary offences, though the transgression may be but slight, and have taken place in the inner world of the thoughts. Hence it is not the power of fate, but the law of righteousness, which he brings into prominence in the intricate fabric of human affairs." (*Dr. Luthardt, Professor of Theology at Leipsic*; who also refers to Fischer and Ulrici, and to Ehrard's lecture on Shakspeare's "Relation to Christianity," in support of his view.) The accusation against the ancient drama is perhaps overcharged, but the tribute to Shakspeare's Christianity—his *Methodism*, in fact—is interesting.

England, but of Europe.* We have all read the many stories of Mrs. Siddons. We know that she nearly frightened to death a young draper's assistant, by the tones in which she said, referring to some calico, "Will it wash?" We have all read her account of her first study of Lady Macbeth; how the horrors of the assassination scene wrought her to such a degree of excitement in the dead of night, that, unable to proceed farther, she hurried away, in a paroxysm of terror, candle in hand, to bed—how the rustling of her silk dress, as she went up stairs, seemed like a spectre pursuing her—and how, when she reached her chamber (this is a delicious touch, which shows the tragic *diva* was still a woman,) she found her husband fast asleep. All this, occurring to a young woman of twenty, who was afterwards to make her Lady Macbeth the Lady Macbeth of all playgoers and thinkers for a space of fifty years, is undoubtedly a great tribute to the power of the play. But it gives no guarantee for the truth of the great actress's interpretation, and it rather suggests that she went on a false tack, for the true Lady Macbeth, in the scene which nearly drove Mrs. Siddons mad with horror, except that she suffered deep wifely concern at seeing her husband so overthrown, and dread lest his unmanageable weakness should betray him, was not very seriously discomposed.† So

* While physical advantages were no doubt the origin of the grander reading, they cannot vindicate misconceptions as sound. Let us hope, moreover, that even where robustness and physical majesty are absent, one may discriminate, if one tries, between new truth, which is born of brains, and eccentric feebleness, resulting only from deficiency of personal qualifications. Some, at least, of our grandfathers found the Kemble acting occasionally deficient in ideas. Charles Lamb said that the great John Philip "flagged sometimes in the intervals of tragic passion. He would slumber over the level parts of an heroic character. His Macbeth has been known to nod."

† It is not generally noticed, by the way, that Lady Macbeth, like women of later times with anything desperate and unwomanly on hand, had intentionally or accidentally fortified herself by drink. Very unsublime, but very Shakspearian, and saved as usual from vulgarity by the dramatist's art of expression—

That which hath made them drunk hath made me bold.

grand a picture, however, could not but seize on the public mind, and its magnificence was taken for truth to such an extent, that even Hazlitt, when in one of her last performances Mrs. Siddons threw in a little bit of nature, complained, in his published criticism, that her "Go, go," in the supreme last agony of the banquet scene, was uttered in the hurried, familiar tone of common life, without a sustained and graceful spirit of conciliation towards the guests.

To Miss Helen Faucit belongs the honour of first dissipating, in the interests of truth and nature, the great Siddons delusion, of showing the world something truer than the massive and monumental style of the Kemble school could realise. Students of the subject may remember an article in the *Westminster Review*, afterwards republished by its author, Mr. Fletcher, in which it was contended that statue-like simplicity was not the essence of the Shakspearian drama, and that to the picturesque complexity, which was its essence, Mrs. Siddons' massive person and sculptured genius were as essentially repugnant as they were akin to the spirit of the antique. The reviewer asserted that "Macbeth belonged to romantic rather than to classic art, and that to succeed in the character of Lady Macbeth an actress must not be a living statue, with the solemn tone of a voice from a shrine; more the sepulchral avenger of regicide than the sufferer from remorse for it; a supernatural being, the genius of an ancient oracle—a tremendous Nemesis." It is known that this essay—so far as I am aware the nearest approach yet made to a true criticism of Shakspeare's play—was inspired by Miss Helen Faucit's performances.

The gentle Rosalind and Imogene became transformed as she faced and comprehended the true meaning of the part which had been so long grandly obscured. Once instigated to iniquity, Miss Faucit's Lady Macbeth had no notion of

turning weakly back before the gains were made. Throughout the criminal passages Miss Faucit was true, as by hard feminine directness, to this principle. But, afterwards, weakness of temperament prevailed over strength of mind and will. In the scene where she read the letter, Lady Macbeth, as impersonated by Miss Faucit, could not resist the temptation to range wildly the supernatural region into which her husband's written words tempted her, nor as the plot thickened, and the robes of ill-gotten royalty weighed heavy from her weakening shoulders, could she stand up against the fearful depression which set in upon her when she found her husband fatally environed by spectral mementoes of the deeds on which their state was based.

This dual character of Lady Macbeth was specially illustrated in the banqueting scene. The ordinary custom is—especially if Macbeth is the "star," for such are the weaknesses of celestial beings—for Lady Macbeth to disappear in a rather common-place way at this point, when she figures for the last time in the action proper of the piece. Her subsequent absence is felt to be almost inartistic, and her sleep-walking, at best, a very elliptical acknowledgment of her poetical importance to the story. Miss Faucit, as if the inheritor of some unwritten stage direction of the dramatist, obviated all this by a wonderful elaboration of silent action at her exit. Even if the *dénouement* had been utterly unknown, it would have been impossible to witness the end of the banqueting scene without feeling that for her there could be, from that moment, no more crime or hearty enjoyment of the greatness secured by it—that by her the cup of life had been drunk, and that she would live in loathing of its lees. During the first excitement of the feast, and even during the first appearance of the ghost, the queen had her game to play, and played it royally. But with the second ebullition of her

husband's weakness, a new light broke in upon her. In a frenzy, she urged the guests to go; then, fearing she had been too brusque, she bowed low, and bade a kind good-night to all. When she rose, after a moment or two, from that posture, she was a broken woman. There had settled over her bent head the gloomy shadow of an irremovable cloud. She had seen that her husband's malady was incurable, that their guilt had enveloped him in an impenetrable curse. She became simply hopeless. She staggered, and was faint. The consolation she gave her husband was given mechanically, and as if in sleep. She tottered to a table; sat down at it; rested her forehead on her hand; touched, as by accident, the crown; feeling it, took off with a melancholy, not quite absent, air, this "top and round" of her irretrievable wretchedness; pressed her agonised brow the more freely for its absence; and let it hang listlessly in her hand, as she marched faintly yet with persistent dignity from the scene of her fearful change. She was the last to leave. There were no train-bearers. Her gorgeous mantle trailed heavily on the ground. She was visibly in a dream — a dream of royal greatness which she must at all hazards support, while at her heart was gnawing the reality not so much of remorse as of doom.

This was very fine, but there was a fault in it; and that fault was destined to be repaired by the insight of a young actress who, in understanding parts for herself, and in courageously acting them as she feels them, is second to no histrionic genius that ever flourished. The fault was egoism—Miss Faucit was too much the paralysed queen, too little the stricken wife. Miss Bateman reversed this. Her queendom was forgotten, her wife's nature was filled with one great yearning, almost of despair, to soothe if she might and to heal if she could her husband's crushed and dis-

tracted mind. It is all suggested in the beautiful, wifely words, "You lack the season of all nature, sleep," but never till Miss Bateman saw it was this perceived. She adopted her conception of the part with her usual courage in all her provincial performances, years ago, when it seemed an audacity for so young an actress, known only in domestic and romantic drama, to essay the character at all. Now at last she has a greater opportunity. In a noble intellectual partnership — wonderfully harmonious, and contrasting grandly with the old state of things, in which, partly from confused ideas, and partly from professional jealousy, Macbeth and his wife were two great creatures, each grudging to seem less magnificent than the other—we see "Macbeth" played in London with all the truth of that conjugal union in high-reaching sin and its "judgment here" which Shakspeare desired to depict. Mr. Irving's contribution is his absorption at all points in the Macbeth whom Shakspeare drew—a Macbeth brave only on the field, but resolute is such wrong-doing as makes for his ambition; a Macbeth whose strength is his unscrupulous cruelty, whose weakness lies in his constant liability to the horrors which Heaven in mercy, as well as in justice, has made, in some minds, at least, and those not always the least determined, the inevitable sequels of guilt. I will not dwell on blemishes. I am not here to deny that the play may have lost something in splendour of declamation, or that the chief actor has aggravated rather than corrected certain mannerisms of delivery that always beset him. I take the performance as a whole, and I take especially the scenes which I have indicated as keys. If you go to the Lyceum Theatre, and watch the two episodes in which Lady Macbeth wistfully follows with sad, tender gazes, and with unconscious gestures of appeal or soothing actions of wifely affection, the distraction and depression of Macbeth, you will, I think, acknowledge that

the new Macbeth is not far from being true. The inner truth of this play is wholly separate from its grandeur, except as both are expressed by its inimitable language; and is only partially and briefly identified with its incomparable beauty. But when the truth has been long obscured, and upon manifestation is rudely and crudely challenged, it is necessary to stand up for it. The grandeur of "Macbeth" may probably be best enjoyed by the fancy without scenic auxiliaries. Its beauty — except so far as it lies in Lady Macbeth's tender sorrowfulness — is somewhat clouded in a representation which undoubtedly does not as a whole sound the full diapason of the poet's matchless eloquence. But the truth is there, with but few and insignificant qualifications, and for its own sake, and for the credit of acting as the most efficient method of elucidatory criticism, cannot be too closely or admiringly studied. Surely every one must be encouraged and spurred to such study, who, going back to his Johnson, reads the extraordinary statement that this play "has no nice discrimination of character," the events being "too great to admit of the influence of particular dispositions, and the course of the action necessarily" determining "the conduct of the agents." I will add, that we can all feel what criticism owes to the stage, when we are told on the same high authority that the effect of the play is to make Lady Macbeth "merely detested." This, after all Shakspeare has done, by the suggestion of her wifely solicitude and self-abnegation, to shelter her with the gentle veil of pity! Well might Gervinus say that the clever player will always be a better interpreter of Shakspeare than the most learned commentator!

The suggestion I have myself made for the right reading of the play is a small one, but I am impressed with its ethical value, and with the fact that here at least criticism must advance where acting can hardly follow it.

Only in the greatest dramatists can we expect to find lying, half-lost amidst stirring action and bold spectacle, minute but pregnant casualties of moral being and character. None the less is it our duty to seek them out. We should not be deterred by any fear such as a great French critic has expressed, of appearing to embark on frivolous subjects. The delicate contrast between the hard-sinning of Lady Macbeth and the timorous sinning of her husband is founded in a difference of attitude towards supernatural religion which might be instanced in every company, and pursued into every relation of circumstances in which differing people have to make choice between good and evil. Such studies can never be unprofitable, nor will they ever cease to occupy the highest genius amongst a people saturated as we are with ideas of moral responsibility under religious sanctions.

For us there is no golden age of ancient beauty, nor any beaming vale of Tempe. Not for us are the rounded forms and seamless draperies of the Greek ideal. Not for us the lightsome laughter of pastoral gaiety, or the sunny merriment of sylvan revels. We cannot prattle and gesticulate in Gallic epigram, nor pose and declaim in Spanish pride, nor lose ourselves in Teutonic simplicities, nor find even in docile picturesque religion a talisman or an anodyne.

> "We look before and after,
> We pine for what is not:
> Our sincerest laughter
> With some pain is fraught;
> Our sweetest songs are those that tell of saddest thought."

And the truest of our great plays unfolds, not only the majesty and mystery of tragedy, but the common exigencies of daily morals.

ON ELECTRICITY COMPARED WITH HEAT AS A SOURCE OF MECHANICAL POWER.

By J. CAMPBELL BROWN, D.Sc., etc.

In what direction can we reasonably look for a substitute for coal?

Since the popular mind began to recognise the fact that the known sources of coal within our reach are rapidly becoming exhausted, and cannot last many hundred years, and especially since the advanced price of coal forced the attention of large employers of steam-power to the difficulties of the not very distant future, many persons have been induced, by the great advances which have been made in the practical application of electricity, to contemplate the substitution of electricity for heat as a source of mechanical power. From a scientific point of view there is nothing absurd or impossible in the proposition to employ electricity as a source of mechanical motion; although the probability or possibility of its being practically advantageous may be a subject for discussion.

The doctrine of the correlation and mutual convertibility of all the physical forces is now thoroughly established;*

* *Law of conservation of energy.* The amount of force associated with matter is definite and constant. Whenever a given amount of energy in one form disappears, it reappears as work done, either as motion, heat, light or some other form, the amount of which is exactly equivalent to the amount which has disappeared.

Mechanical equivalents of heat and electricity:—

The amount of heat required to raise—		When converted into motion, can lift—	
1 lb. water	1° F.	1 lb.	772 feet.
1 lb. water	1° C.	1 lb.	1390 feet.
1 gramme water	1° C.	1 gramme	423½ metres.

The amount of electricity required to eliminate 1 gramme of hydrogen and 8 grammes of oxygen from water, is equivalent to about 34,000 units of heat = 14,400,000 gramme-metres.

and any one of these forces which happens to be at our disposal may be taken as reasonably as another for conversion into mechanical motion. Although a given quantity of one form of force always yields, when converted, an equivalent quantity of other forms of force, none of it being ever destroyed or lost, yet we are never able, with the imperfect machines which we can make, practically to convert the whole of a given force into the precise form of force which we require, nor can we ever transfer the whole of any force from one machine to another; a portion of the force is always converted into some form which we do not want; it is practically as bad as lost. The most familiar illustration of this impossibility is the loss of motion by friction, which occurs when we transfer mechanical motion from one machine or part of a machine to another; some of the mechanical motion is converted into an equivalent quantity of heat, and hence for mechanical purposes is lost. The greater the number of conversions into different forms which a given amount of energy undergoes before it reaches the point to which we want to apply it, the smaller will be the ultimate fraction available, and the greater will be the proportion of force lost, just as an increase in the number of different parts of a machine increases the loss by friction.

In the conversion of heat into mechanical motion by means of the steam-engine, so much heat is lost (using the word lost in a popular and unphilosophical sense) that only a small fraction, about one-ninth, of the heat generated in the furnace can be ultimately utilised as mechanical power. One pound of coal will convert rather more than ten pounds of water into steam; or will raise upwards of 10,000 lbs. of water 1° Fahrenheit, that is, it will do about 8½ millions of foot-lbs. of work. One grain of coal, when burnt, develops heat equivalent to about 1,215 foot-lbs., but it only enables the best Cornish engines to do 143 foot-lbs. of work.

In constructing electrical engines, the great difficulty hitherto has been to get a considerable fraction of the given force — electricity — converted into the required force — mechanical motion — without being dissipated in some other form, such as heat. It is true that Professor Jacobi constructed an electro-magnetic engine which propelled a small boat, with twelve persons on board, at the rate of four miles an hour; Mr. Robert Davidson drove an electric locomotive on the Edinburgh and Glasgow Railway at the same rate; and Professor Page constructed a four- or five-horse power reciprocating engine. An idea of the principle on which these machines were constructed, may be gained by examining the toy electro-motive pump placed on the table. No electro-motive engines have yet been made sufficiently perfect and convenient for general use, but there is no doubt that they can be very much improved, and that engines can be made, and probably will be made, capable of producing every variety of motion much more conveniently, and with much less loss of power, than any constructed upon principles hitherto known. By means of Gramme's machines, similar to the one upon the table, M. Breguet converted a known amount of motion into electricity by one machine, and then passing the current through the second machine, converted that electricity again into motion, and found the loss to be only thirty per cent. This is by far the best result hitherto obtained, and the motion is continuous and rotatory.

It is therefore desirable to enquire how far it is worth our while to endeavour to make electrical currents or magnetism more available as a prime mover of machinery.

An electro-magnetic machine ought to yield force equal to 112 foot-lbs. for every grain of zinc consumed in the battery; but in practice, only the equivalent of 70 or 80 foot-lbs. can be obtained as a current outside the battery for

each grain of zinc. Comparing this result with Cornish steam-engines, which do 140 foot-lbs. of work for every grain of coal consumed, and remembering that zinc costs twenty-eight times as much as coal, we see why electric-engines cannot compete with steam-engines; the work of the former costs fifty times as much as the work of the latter. A further reason, as has been hinted, is found in the fact that steam can be far more easily, perfectly, and conveniently applied as a prime mover than electricity.

The source of the power of a steam-engine is the chemical force resident in the coal and the oxygen of the air. 1st, chemical force is converted into heat; 2nd, heat is transferred with great loss to the water and steam in the boiler; the steam is conveyed, with more loss of heat by conduction and radiation, to the cylinder; where, 3rd, it expands against the pressure of the outside air and the resistance of the machinery, and heat is thus converted into mechanical motion, with still more loss by friction.

In like manner, zinc is the fuel of an electrical engine; and the source of its power is the chemical force resident in the zinc and the acid of the battery; 1st, the chemical force is converted into an electrical current with considerable loss in the form of heat; 2nd, the current is converted into magnetism; and, 3rd, by attracting movable bars suitably placed, magnetism is converted into mechanical motion, with great loss arising from the decrease of attractive power in the ratio of the inverse square of the distance, and from heating and other causes.

(The loss of force, arising from the decrease of magnetic attraction as the square of the distance of the attracted body increases, is one of the chief difficulties in the way of the employment of magnetism as one term in the transformation of force in useful machinery; and it appears to me to be the only point in which Gramme's machine is placed at a disad-

vantage when compared with previous magneto-electric machines, which in other respects it excels.)

By perfecting our batteries a larger proportion of the chemical force resident in the zinc will no doubt be made available as a current; and, in like manner, by economy of fuel, improvements in furnaces and boilers, and by preventing the escape of heat, a larger proportion of the chemical force resident in coal will be utilised. We must therefore calculate the relative economy of the two sources of power on the supposition that all the chemical force originally resident in the molecules of the zinc and fuel is utilised; and it will be convenient to compare pure zinc with pure carbon rather than with coal.

It may be borne in mind that 125 parts of coal* are equal to about 80 parts of pure carbon. One grain of zinc, dissolved in sulphuric acid in the battery, yields sufficient heat to raise 0.146 lbs. of water 1° Fahr.; calculating this into its mechanical equivalent, we get 1 lb. weight raised to the height of 112 feet, or 112 lbs. raised 1 foot.

One grain of carbon, burned in oxygen or air, yields heat sufficient to raise 2,007 lbs. of water 1° Fahr.; the mechanical equivalent of which is 1,603 foot-lbs. It appears then that carbon contains 14¼ times the store of force, which is yielded by dissolving an equal weight of zinc in sulphuric acid. The reason why zinc yields so little force in this manner, is that a large proportion of the heat evolved by

* 1 lb. carbon yields .. .. 11,227,968 ft.-lbs. of force.
1 grain carbon yields .. .. 1,604 „ „
1 lb. coal yields .. .. .. 8,337,600 to 8,916,600 „ „
1 grain coal yields .. .. 1,200 „ „
1 lb. zinc yields, when dissolved in sulphuric acid .. .. 774,800 „ „
1 grain zinc yields, when dissolved in sulphuric acid .. .. 112 „ „

burning the zinc is taken up by unburning the hydrogen which is set free from the sulphuric acid. Thus:

	French heat units.
Heat evolved by oxidation of 32½ grammes of zinc	42,413
Heat evolved by combination of the resulting oxide of zinc in sulphuric acid ...	10,455
	52,868
Heat evolved by oxidation of 1 gramme hydrogen, and absorbed by setting free the same quantity	34,462
Difference = heat evolved by solution of 32½ grammes of zinc in sulphuric acid	18,406

One grain of zinc will yield, when burnt in oxygen, 0.3345 Fahr. units of heat = 258 foot-lbs.; but when dissolved in sulphuric acid, only 112 foot-lbs. So that even if heat were not more easily applied than electricity to the production of mechanical motion, it would be more economical to burn zinc in a furnace to generate steam-power, than to dissolve it in a battery to generate electro-magnetic power.

If we compare the total force yielded by carbon and zinc respectively when burned in oxygen or air, we find that 1 grain of carbon yields 1,603 foot-lbs., and 1 grain of zinc yields 258 foot-lbs. That is, carbon yields 6⅕ times as much force as zinc when both are burnt; and we have already found that carbon yields 14¼ times as much force as zinc when the zinc is dissolved in sulphuric acid.

But these proportions do not exhibit the whole of the waste of force involved in using zinc instead of carbon as the primary source or fuel. For carbon is found in nature, as coal, wood, etc. But zinc is not found in nature; it has to be manufactured, and it cannot be manufactured without

consuming carbon. Theoretically, one part of carbon must be used to set free five and a half parts of zinc; but, practically, there is the loss which always occurs when we effect transformations; the loss in the present instance is represented by the large quantity of coal which is consumed in raising the temperature of the smelting furnace, in addition to the one part of carbon necessary to replace every five and a half parts of zinc in the ore. (In passing, we may notice the futility of the argument that zinc, although not economical now as a substitute for carbon, may become economical when coal becomes scarcer and dearer; for unless zinc were found free in nature, we must use up a certain quantity of carbon, or its equivalent, in order to get metallic zinc; and hence, as the price of coal rises, the price of zinc will rise still more rapidly.)

With carbon and zinc at our disposal,—carbon as a source of heat, and zinc as a source of electricity,—it is evident that when the production of mere brute force is our object, it is better worth our while to expend our ingenuity in perfecting heat-engines than electro-motor engines. But it might be different if electricity were to be obtained directly from the consumption of carbon. Those who desire to replace steam by electricity have two problems before them: they have not merely to improve the engines for the conversion of electricity and magnetism into motion, but they have first to solve the preliminary difficulty of providing a cheap and abundant supply of electricity directly from the carbon. At present, the cheapest way of getting a supply of electricity is to burn coal to work a steam-engine to move a magneto-electric machine for the conversion of mechanical motion into electricity; it would be manifestly absurd to use the electricity thus obtained for the regeneration at the same place of a part only of the motion from which itself was obtained.

(If our natural supply of carbon were exhausted, it is true that electricity could still be obtained at moderate cost from other materials; for instance, from iron pyrites and zinc blende, or galena, with sea water, as an exciting liquid; but the weight of material required would be far too great to allow this source to be used for locomotive and many other purposes, even if the strength of current thus obtained were many times greater than it is.)

Should electricity ever be obtained as heat is now, directly from carbon, in quantity equivalent to the whole of the chemical force resident in the carbon, it offers many advantages over heat which would render it desirable to perfect our machines for converting electricity into mechanical power.

Although, as has been said, there is no prospect of our ever using electricity for the generation of mere brute force, it is not to be inferred that endeavours to construct new electric-engines should be discouraged even at present. Great as has been the development of useful applications of electricity during the last quarter of a century, still greater triumphs are doubtless in store for it. But it can only be usefully employed for purposes to which its properties render it peculiarly applicable, and for which the greater power of the steam-engine is not conveniently available. Some of these purposes will be suggested by a few illustrations.

1. Electricity can produce a more intense heat, and therefore a more intense light, within a limited space, and better under control than combustion.

2. Electricity can be generated at one place, conducted to another place at a great distance, and be there used for generating light, heat, or motion; and can be controlled by a person situated at the point of generation, or the point of application, or at any intermediate point. Thus, by the electric telegraph, a person situated at the battery, or any-

where along the line of wire, can produce whatever signals he chooses, at one or more places at any required distance; or, in a similar way, he can ring a bell or do any kind of work. By the electric clock the motion of a carefully-regulated pendulum at Greenwich can regulate the motion of any number of other clocks, situated at any distance from the first and from each other. Other applications of a similar kind will no doubt be multiplied.

3. In electro-plating and the production of electro-copper, a current of electricity, generated by a battery or by a Gramme's machine, is employed to restore the metals to the free state, with their full complement of chemical force resident in them; and the metal deposited by this means is both purer and deposited in a more uniform film than it could be if it were reduced by means of heat.

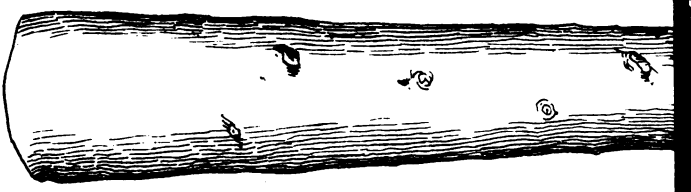
The chemical applications of electricity might be indefinitely increased.

The power of transferring force to a distance in the form of electrical currents, is one of the most important advantages which electricity offers for practical purposes, and is likely to be extensively applied in the future. It has been proposed by M. Nolet to convey motion from place to place by pneumatic tubes, and a company has been formed for that purpose. Now, there is no form of force which can be so readily and economically conveyed to a distance as electricity, which can be distributed to a multitude of different places instantaneously, and so as to be completely under control at any point along the circuit. It might be advantageous, therefore, in many cases, to convert motion into electricity at a point where motion can be obtained most cheaply, and convey it by wires to those places where force is most wanted, and there re-transform it into motion, or into any other form of energy which may be required.

A committee of the British Association has been

appointed to investigate and report upon the utilisation and transmission of wind- and water-power; doubtless they will include in their investigations both pneumatic pressure and dynamical electricity; and it is evident that if electricity could be as readily converted into motion as it can be transformed into heat and light, the cost of its transmission from a water-wheel or a tidal reservoir or a windmill, to a great distance, would be very greatly less than the cost of the conveyance of pressure by pneumatic tubes. If coal could be consumed so as to generate electricity directly without loss, the force might all be generated at the pit-mouth, and transmitted to the consumer by wire.

Let us return for one moment to the question with which we started. Where can we reasonably look for a substitute for coal? There neither is nor will be any substitute for coal, if in that term we include petroleum, oils, peat, and wood; in short, carbon and hydro-carbons. Force cannot be created, it must be obtained from previously existing stores of force, and when it has been equally distributed there is no collecting it again. We must economise our carbon, and when it becomes exhausted, we may utilise the force of the sun, growing wood by its light, warming ourselves, producing evaporation, or obtaining mechanical power in the shape of wind from its heat, and obtaining mechanical motion from its attraction, and that of the moon, by means of the tides; but in the earth itself, apart from other worlds, we can expect to find no store of force, either in the form of chemical force, heat, light, or electricity, which will take the place of our carbon deposits. We may learn to do without coal, but we can hope to find no substitute.



a a Represents a menhir, 30 feet long and 8 feet broad.

b b Represent two trees, say about forty feet long, either naturally or made longer by the lashing on of spars. These trees are lashed on to the block.

c c c c Represent a number of cross pieces—by preference, bamboo—which stand about 36 inches apart, each being lashed on to the main wood.

The blue dots, not drawn to scale, represent men, to whom 18 inches are given from shoulder to shoulder, and 12 inches from back to front.

Both sides of the cradle are furnished alike; and the length of the main timbers, and of the cross pieces, vary with the size of the stone and its weight. Supposing that *c* 1, *c* 2, *c* 3, *c* 4, and *c* 5 are all manned, there will be about 300 persons on one side of the stone, and when both are manned, there will be 600 persons to carry about 520 *cwt.*

If the cross pieces are not bamboo, a hand-hole is made for each person.

ON A MEANS EMPLOYED FOR REMOVING AND ERECTING MENHIRS.

By THOMAS INMAN, M.D.

It is probable that there are few who have either read or travelled much who have not had their interest incited by seeing or hearing of the enormous masses of stone which have been moved from one place to another, by people who are supposed to have had few, if any, of the modern appliances used by our engineers. The huge size of the stones employed in the temples of Baalbec and Palmyra, and the gigantic masses in Egypt, known as the Great and Little Memnon, have long arrested the attention of archæologists; whilst, in more modern times, we have been able to get a reliable historical account of the removal to St. Petersburg of the vast fragment of rock upon which the colossal statue of Peter the Great reposes.

We in England have had our curiosity aroused by seeing such massive stones as exist in Stonehenge arranged upon a definite plan; and those who have visited Stanton Drew, near Bristol, may see great lumps of undressed stone, of lesser height than those of Stonehenge, but of greater weight.

The highest stone set upright which we have in England, is in a churchyard in Rudstone, in Yorkshire. Of this, 12 feet are buried, but there are 29½ feet above the surface of the ground, giving a total length of 41½ feet.

At Loc Maria Kir, in Brittany, the ancient Armorica, there is a fallen menhir, which, having been originally placed upright, has fallen or been thrown down and fractured into four fragments. Its total length is 61½ English feet, and the weight of the block is calculated at 260 tons.

The weight of some of the stones in some of the Egyptian pyramids exceeds this, and the weight of the Great Memnon is far greater.

The problem how these enormous masses have been moved has often been discussed, and it would be useless for me to enter on this wide subject. Layard has found a solution of a part of the matter in *Ancient and Modern Assyria*, having transported the enormous human-headed bulls a considerable distance, by means of a rudely formed truck, drawn by the main force of some hundreds of men. Pictures found in the tombs of Egypt have also shown us that the chief means employed in the conveyance of enormous masses of stone was the sheer strength of numbers.

It is interesting, as I may notice in passing, to observe that the fishermen and women in Italy employ the same method of hauling on the two ropes of their large nets as were used by the Egyptian slaves. Each one has a broad band, which falls from the left shoulder to the right hip, and there terminates in a limp cord, having a large leather button at its free extremity. The free end is struck upon the main drag-rope, and at once laps so tightly round it that the man can at once throw all his weight into the shoulder strap. By this means the main rope is never weakened, and the person can, as soon as he has reached the upper margin of the shore, unfasten himself from that part of the rope, and go seaward to take his place once more at the drag.

Again, in the Lateran Museum at Rome, there is a sculpture which depicts the powerful movable crane which was used in building by the Romans.

But, in the cases referred to, there has evidently been considerable artistic knowledge, and the engineering, however rude, has been directed by thought and skill.

I desire rather to call the attention of the Society to those cases in which there cannot be said to be any engineer-

ing knowledge at all, at least in the ordinary sense of the word, and in doing so I shall confine myself, as far as possible, to the erection of upright stones or menhirs.

I scarcely need tell the Society, that menhirs have been erected in countries widely separated. One may find them from the east of India to the west of Europe and the British Isles. Stone circles exist in the Dekkan, on the east, which do not essentially differ from the stone circles in Cornwall, and much ingenuity has been exercised in the endeavour to form a reasonable theory about the idea which has occupied the minds of those who raised them up.

When a party has long been wandering in a mist over an extensive plain, it is a great pleasure to discover something which is real; a something which will act as a landmark, and unite the different members in their previously divergent opinions as to the proper track.

Having long had an interest in this subject, I have never lost sight of an opportunity of making inquiries about the matter from those who have been in India, and especially in those parts where menhirs are very common. Not long ago it was my good fortune to spend a long evening in the presence of Mr. Greey, a civil engineer, who had been stationed in a somewhat out-of-the-way district in Hindostan, to prepare for and to lay a railway. To me his conversation was full of interest, for he was a keen observer and a shrewd man. Amongst other things, I may notice that from his own observation he had come to the same conclusions as my friend, Dr. Oldham, has done, viz., that "malaria," in the ordinary sense of the word, does not exist, and that the cause of ague, remittents, etc., is exposure to cold after the body has been exhausted by the heat of the sun and toil. But the most striking part of his discourse was that which treated about menhirs; and I was extremely desirous that he should put into writing, for one society or another, that which he

told me. He promised that he would, but he died suddenly a few days after I saw him, and, as he left no written memoranda, I am obliged to draw upon my memory.

This I regret much, for, in the first place, I dare not be quite sure what people of India he was speaking of. I made a note of it at the time, in pencil, but the word became obliterated in my pocket during a shaking railway journey, but I think that Mr. Greey called them Khasias, and I feel more supported in this recollection by having found out, since our chat, that these people have already been described as menhir raisers.

A good account of this tribe is to be found in the *Journal of the Anthropological Institute of London*, October, 1871, and which was written by the pen of Major Godwin Austen, of the Topographical Survey of India. The people in question are a large tribe living on the highlands of the north-east frontier of Bengal, and occupy what are called the Khasia Hills. Of these Major Austen writes, "Certainly the most striking objects of interest in the Khasia Hills are the upright stone monuments that are to be seen all over the country; these, set up by the wayside, or in the villages, more frequently cutting the sky on prominent hills, with the large slabs horizontally set before them, at once recall the Druidical remains of our own island. The tall upright stones are called 'Mao Bynna,' equivalent to 'a stone to make known.' They are also known by the term 'Mao Shinran,' the male stone, whilst the flat seat-like slab in front is called 'Mao Kynthi,' the female stone, representative of all life being in pairs. Without the slab the monument would be imperfect. These stones have nothing whatever to do with death or burial or with any funeral obsequies. The monument simply perpetuates the memory of some person long deceased, who, as a spirit, has watched over and brought good fortune to a descendant, race, or clan. Thus, a certain old

woman, of the Kūr clan, not famous for anything particular during her life, but to whom many virtues were assigned after her death, for the particular sub-clan (Nonglariang) to which she belonged, from being very poor, became wealthy and prosperous under her guardian angelship. To honour this person, sixty years after her death, five well-cut stones were erected to her memory, and as the clan continued to prosper, it added, on the other side of the road, but opposite to the former, another line of five stones."

The stones are never erected in even numbers, and the most common numbers are 3, 5, 7; even numbers are considered imperfect; and though at times the stones are arranged in a circle, they have generally a linear arrangement, as have those at Karnak, in Brittany.

Sometimes the stones are erected under a vow—a sick man, perhaps, promising to erect a stone, or stones, to an ancestor, in case he should recover.

In setting up these stones, all members of the community are under an obligation to assist, without other payment than a slight repast when the work is done. But the stone-cutters are paid, and a rude music is made to entertain them during their labours.

Major Austen said, that he never saw the process of raising a stone into the upright position, but he saw the spars which had formed a sort of cradle, on which the last stone erected had been moved. They consisted, he says, of strong curved limbs of trees, roughly smoothed and rounded, and would present a very small surface to friction. These stones, he adds, had been taken from the side of a hill near, and had apparently been wedged out of the face of a step in the exposed sandstone strata. It is clear, on this occasion, that main strength was used in dragging, and not in simple carrying. Sometimes granite is used, and the following gives an idea of the size of the largest slabs the Major saw. One of

granite was 18¾ feet long, 3½ feet broad, and 9 inches deep—49 cubic feet. The highest sandstone menhir seen was 18½ feet high, 3 feet 4 inches broad, and 1 foot 8 inches deep—104.7 cubic feet. The largest slab of granite was 30 feet 4 inches long, 10 feet broad, and 1 foot thick — 329 cubic feet,—and in weight equal to nearly 24 tons.

In a conversation that followed the reading of Major Austen's paper, reference was made to the old method of using fire and water to detach large blocks from the parent rock, but into that I do not profess to enter, as the art of cleaving stone and dressing it would deserve a paper to itself.

I now come to the description which Mr. Greey gave to me of that which he saw, and this was the simple transportation of a large block up a hill 4,000 feet above the starting place in the course of three or four hours. The weight of the stone, Mr. Greey estimated at between 20 and 30 tons, and we may compare this with the largest stone mentioned by Major Austen. When my informant came upon the scene, the stone was placed upon two long trees—pine most probably—which were placed horizontally and parallel to each other, one at the head, the other at the foot of the block. These were retained in their places by being lashed firmly to the slab; each projected a considerable distance on both sides of the megalith; and at intervals of about 36 inches from each other, cross ties were lashed, parallel with the stone, and with the ends projecting beyond the first and last tree. This arrangement divided the cradle on each side into parallelograms, into each of which sixty men could pack themselves, two abreast, each man having a firm hand-hold of the secondary bars, *i.e.*, those parallel to the stone. In the rows nearest the block there would only be one line of men, and it would be the same on the outside cross piece, so that taking the breadth of a man to be 18 inches, and his depth 12, there would be room for about 60 people, who

could easily lay hold on the wood beside them. According to the plan, sent herewith, you will see that there is room for 600 bearers, and as I take the weight of the block and frame to be, say, 26 tons, there would be 600 persons to carry about 520 cwt., less than 8 stone per man. This certainly is not more than men, even Hindoos, can readily carry. At any rate, my departed acquaintance told me that he saw the company assembled, which he did not count, take each man his place, and, at the word of command, raise the vast block, and walk off with it to the hill top, 4,000 feet, as I understand, without a stop.

I can well imagine that the members of the Society will here draw their breath, and say, oh! I certainly should have done so myself in days gone by; but my experience in Italy, and notably at Amalfi and its environs, showed that the country people who were, in comparison to me, a set of meagre scarecrows, could ascend a steep hill, some 3,000 feet high, with a huge load of paper, flour, or other material, which I doubt whether I could have lifted from the ground, and with the same apparent ease as I could without a heavier burden than my clothes. Having seen the Italians carrying these heavy packages; having seen young lads in Switzerland carrying, for hours together, and without a rest, the luggage of a party of gentlemen; and having read much of what Swiss, Tyrolese, Spanish, Portuguese, and other women do, I am quite prepared to believe that even a weight of 12 stone per man could readily be borne up hill by the Khasias, and for many hours without a rest.

Well, the stone was carried up the hill to its resting-place. It remained there to be erected. Whilst the folks who had been the bearers in a body rested for a while, a few of their number dug a hole at the spot where the stone was to stand.

Here let me remind members about the way in which

painters or builders raise a long ladder. Some are told off to lift the ladder, and one has to stand on the other side from them and at the ladder's foot. This is to prevent the wood sliding along the ground when it is raised somewhat above the horizontal, on its way to the perpendicular. What the painter does with his weight, the stone erector does by making a hole in the ground. Into this the largest end (generally, but not always) is lowered by cutting all the lashings of the lowest tree. The stone thus becomes "slantendicular," as the Yankees say, and the men who were engaged upon carrying the lower part occupy themselves by unlashing the lower tree and cross pieces, and by casting ropes round the upper tree and its cross pieces. Then the upper tree is manned by ropes, upon which all, except those who have to look after the hole, and fill it in as the stone becomes erect, can haul. The loosened cross pieces do not lose all their hauls, which remain attached, so as to keep the balance true. At length the mass is upright, and the hole in which its lower end stands is filled in. The whole process does not occupy more than three or four hours, and, as may be seen by the account of Major Austen, it is a very inexpensive one.

Once I might have doubted whether neighbours would help each other without a money consideration, but having read much of "building bees," or "harvest bees," or "draining bees" in America, when everybody within thirty or even sixty miles will come and help a neighbour without other remuneration than decent food, whiskey, water, warmth and dancing, I can doubt no longer.

Again, few people can doubt the power possessed by numbers of men when they are directed so as to apply their respective energies simultaneously. The fishermen on a beach combine together to haul their boats up high and dry on the shore, and we see that which one man cannot stir, rapidly run away with by a score or more. In like

manner, if we go into an iron forge, we may see a heavy forging, of thirty or forty tons weight, turned over by some thirty or forty men as if it were a straw in the fingers of a pigmy.

Indeed, there is little that is wonderful in the method adopted by the Khasias for transporting heavy blocks of stone, and it is the very prosaic character of the proceedings which deprive us of much of our interest in them. We would, from long habit of thought, have preferred to be told that the people who erected Stonehenge and Stanton Drew, the stones of Stennis, and that of Loc Maria Ker, had in their possession a wonderful engineering secret, which, with the death of the people who erected those monuments, had passed away from the world. The result seems to us to be something like the birth of a mouse after a mountain had been shivering with an earthquake.

Still more vexatious is it to know that these pillar stones, and their accompanying slabs, are not now erected—whatever may have happened in the past—to commemorate the death of a king, a priest, or a warrior; they do not rise with any sentimental idea such as has been associated with the spire or minaret, nor are they put up simply as an act or evidence of any particular form of faith. They are nothing more than a somewhat prosaic means to express thanks for good luck which is supposed to have been brought about by the intercession of some ancestor.

But I may pause here for a moment, to call attention to the evident fact that these rude Khasians have as strong and living faith in the existence of immortality as even the most vigorous churchmen in Great Britain. It would seem that they have a tradition that their tribe came from the East; and we may well believe that their notions about the influence of their dead relatives has come from China, wherein a faith in the power of dead ancestors is conspicuous in every position of life.

The question might now very naturally arise—"Is it possible that these modern Khasias are the representatives of the pillar raisers of Western Europe?" I see no reason to doubt it. In the Dekkan (India), Col. Meadows Taylor has shown us that there are stone circles, cromlechs, and kist-vaens, which do not in the smallest degree differ from those in Cornwall and Western Europe generally. He has explored tombs in Central India, and found that the burial rites had evidently been the same as those practised by the Scythians. Other explorers have found similar burial places in the Crimea, and Col. Taylor has found precisely the same kind of funereal remains in Yorkshire.

Early history has told us that the Scythians spread themselves more widely in Asia and Europe than any other nation; and we know that the Russian is the same, both in manner and language, from the east of Asia to the west of Europe.

But, where it is impossible to obtain certainty, it is useless to drive an argument too far. The use of observations, such as I here indulge in, is to help us to understand, and retain in our memory, such facts as we know, and to induce us to associate them with others, Philologists have for a long time, and with a strong show of truth, endeavoured to prove that a people coming from Central Asia gradually spread themselves, by successive waves, from the Himalayan highlands and Bactria as far west as Britain; and if, where they trace language, we can also trace similarity of custom, we may assume, either that the language and the customs went together, or that the one preceded the other. If one observer traces the Aryans from Asia to England by their language, another may be allowed to trace the Scythians from Thibet to Ireland by the remains, not of language, but of customs.

If we permit speculation thus far, we may fairly guess

that each menhir of Africa, Spain, Brittany, England, Scotland, and elsewhere, may represent the gratitude of a family or a tribe for a series of good hunting seasons, and possibly a successful war against wild animals, as well as for the gain of a pitched battle against earlier settlers, if there were any, or subsequent invaders, if the Scyths were the first colonists.

It is not pleasant altogether to have one's belief, that the menhirs and stone circles represent a rude but distinct form of religious faith, rudely shaken by an appeal to moderns who still erect the same kind of monuments as did the ancients; yet we ought to be thankful for any light which is found to illuminate, even imperfectly, the dark grotto of doubt. If we accept facts in this spirit, we may fairly calculate upon an advance in knowledge.

I may, in conclusion, say a word about the antiquity of the custom still common amongst the Khasias. The only menhir of whose age we can reasonably judge is, as far as my knowledge goes, the Caaba of Mecca, which had in front of it a hole instead of a slab. This stone was for an indefinable time sacred amongst the Arabs, prior to the time of Mahomet. Its only claim to respect was its high antiquity and its unknown origin. This was prior to the prophet of Allah assuming his mission, about A.D. 600.

The custom of raising commemorative stones, however, can be traced back as far as the time of Jacob, whose stone, raised at Bethel, is often referred to, as is also the stone called Ebenezer, which was raised with much the same idea as the Khasia menhir, viz., not to commemorate a battle, but as a thank-offering for good fortune. It is probable that the Caaba was erected with the same view, and at a period when wars, and consequent good fortune to one tribe or another, were common.

The Romans did not do much in the way of erecting menhirs, but they had an expression, "Mark this day with a white stone," whenever particularly good luck had befallen them.

This Roman custom may be said to be a survival of a savage habit, and, if so, we must conclude that the British and French upright stones were not the work of our Roman invaders.

We have improved, both on the stone pillars and the white stones, for we erect memorial churches, and place a fine stained glass window in a cathedral, from the same cause that a Khasia would raise a menhir.

ON THE KHĀSI HILL TRIBES OF NORTH-EASTERN BENGAL, AND ON THE GEOLOGY OF THE SHILLONG PLATEAU.

By ALFRED MORGAN,

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The allusions to the Khāsis in a Paper recently read before this Society by Dr. Inman,* interested me so much that I made diligent search for, and have had much pleasure in reading, the scattered papers on the people and their territory that have been within my reach; and as the information is not very readily attainable, I thought a few notes might not be unacceptable to the Society, and might appropriately follow that communication.

Dr. Inman, in his Paper, mentions this people as one of the few existing races that still continue to erect those monolithic monuments which, like the menhirs of the familiar Stonehenge circle, wherever they are found, awaken our curiosity as to the builders of them, and the purpose they were intended to serve. I agree with Dr. Inman in the opinion he forms, and which he shares with Major Godwin-Austen, that these structures among the Khāsi Hills were and are erected as memorials of the dead; but it is not my intention to discuss that question now.

It is extremely interesting to trace the geographical distribution of these monuments, and we are probably correct in assigning an eastern source as the centre of their inception. But I would suggest that the Khāsis may be more justly regarded to have a collateral rather than as a lineal

* See *Ante*, page 103.

descent from that source. The people have, indeed, a tradition that they have come from the eastward, but there is no proof of any great antiquity that can be brought forward in connection with the megalithic and monolithic structures of India. We know but little of the pre-historic people who raised similar monuments in Europe, but we look across Asia to the distant East as the direction from which they came.

The region inhabited by the Khāsi tribes is the central portion of what has been denominated by Mr. H. B. Medlicott, of the Indian Geological Survey, the Shillong Plateau.* Cherra Poonjee, the principal station, is situated in latitude 25° 16′ 35″ north, and in longitude 91° 43′ 15″† east. It is 4,120 feet above the sea level, and is 3,000 feet above the level of the plain of Sylhet.

The overland route to China would traverse these plains, and, from a natural history point of view, there are few districts surpassing it in interest. The entomologist is familiar with the locality in connection with several species of Orthoptera.

Manners and Customs.

The principal source of our information, with regard to the manners and customs of the Khāsis, is a memoir from the pen of Major H. H. Godwin-Austen,‡ a name well known in all departments of Indian anthropology and natural science. Accompanying this paper is a series of sketches of the menhirs and cromlechs which are usually, indeed, the centre of interest in all the papers in which the Khāsis are mentioned.

Dr. Hooker refers to the people and their monuments in his *Himalayan Journals*, and again in his Address as Presi-

* *Memoirs of the Indian Geological Survey*, vol. vii., p. 152.

† Approximately.

‡ *Journal of the Anthropological Institute, London*, vol. i., 1873.

dent of the British Association, at the Norwich meeting in 1868, and remarks the circumstance that no archæological treatise on the subject of monolithic circles, etc., contains a reference to the Khāsi monuments.

The most valuable paper on the physical geology, meteorology, etc., of the Khāsi territory, is by Dr. Thomas Oldham, Superintendent of the Geological Survey of India, and is contained in vol. i. of the *Memoirs* of the survey.

The papers by Mr. H. B. Medlicott, Deputy Superintendent on the Geology of Assam,* and on the Shillong Plateau,† complete a series of singularly interesting and valuable memoirs, replete with vivid descriptions of scenery, and details of suggestive phenomena. Some of the geological sections differ from what has been observed in the sequence of European formations.

There only remain to be mentioned the papers of the Rev. J. Pryse, of Calcutta, published in the *Calcutta Review*, which are the source of much of our information on the religion, etc., of the people.

The various modes in which the word Khāsi has been spelt by different writers, is puzzling to European readers. It appears as Khassyah, Kasia, Cossyah, etc.

On the maps issued under the authority of the Great Trigonometrical Survey of India, the Jonesian system of orthography is adopted; and on the maps of the Revenue Survey, issued from the same office, Gilchrist's method.

The difficulties in the way of the attainment of anything like uniformity in the spelling of geographical names is very great. No two travellers have the same appreciation of sound; and words which have never, perhaps, been written, may appear to one to be correctly represented upon paper by a combination of letters, which to another may convey an

* *Memoirs*, vol. iv. † *Ibid*, vol. vii.

almost opposite sound. Nor should we expect that the majority of the individuals of a primitive race, with whom a traveller may converse, would pronounce a geographical or other name precisely alike.

Major Austen observes that the people call themselves Ki Khāsi, and their country Kā Ri Khāsi; and he suggests, as a derivation of this word, the Hindustani Ghāsi = grassy, the whole of the country being of this nature. "G," he says, "in words of Hindustani origin, has the sound of K."

Nearly all writers agree in the testimony they bear to the superior morality of the people, contrasting it with the lower degree that suffices for their neighbours inhabiting the plains. If, as Dr. Hunter, in his *Rural Life in Bengal*, observes, it is to the hill tribes we must look as the principal sources of the future invigoration of our Indian empire, this is an important fact.

One of the customs of the people that is conducive to morality is, that the young men of their communities shall reside apart in a Bachelor's Hall.* In this building they not only sleep, but take their meals also.

In the Khāsi funeral rites there is much that is wonderfully strange, and were we able to explain their meaning and significance fully, would prove of great interest. Probably, the symbols of the intuitions of a remote era survive in these rites.

Cremation is the custom among them, and the calcined bones and ashes are placed in small earthen vessels, and buried. Each clan or family has its own burying place, which is usually marked by a conspicuous stone structure, though the remains are not consigned to these bone receptacles until a considerable time has elapsed, often a year or more, after the burning of the body. Mr. Pryse considers

* C. Brownlow. *Proceedings Asiatic Society of Bengal*, No. i., 1874.

that this collection of the bones of a clan into one vault is due to the impression that the souls of the departed may all mingle together again in one large family, without trouble or suffering. The idea of any member of his family being a wanderer in the other world, cut off from and unable to join the spirit circle of his own clan, being most repugnant to the feelings of a Khāsi.

They have no temples, nor idols, but believe in dæmons, and suppose themselves to be in communion with, or in the power of, the manes of their race. Every dark, shady wood, every stream, every conspicuous hill, has its presiding dæmon. They suppose the spirits of the departed are always in close proximity to the residuum of their mortal bodies; and Major Austen makes some interesting remarks on the extreme care that is taken to preserve the family remains intact.

When a chief or person of eminence dies, it is usual to preserve his body in honey, in its coffin, for some length of time. This custom is not peculiar to the Khāsi; it is shared by them with the Burmese and the Persians.*

Among the hill tribes, generally, a strange custom prevails of breaking eggs as a mode of augury. The number of eggs that are broken on an occasion of enquiry averages about twenty. The exorcist throws the eggs singly, with all his force, upon a board that is constructed for the purpose. The position of the chips of egg-shell that result is supposed to indicate the answer that is sought. The egg is personified and addressed thus:—"Egg! I am but a man, am ignorant, and can divine nothing; you can commune with spirits, and between man and them you have intercourse. Now, say! who has done this? or who has caused this man to fall sick? If the spirit is in this house, let the signs be on the right; if out of the house, on the left," etc.

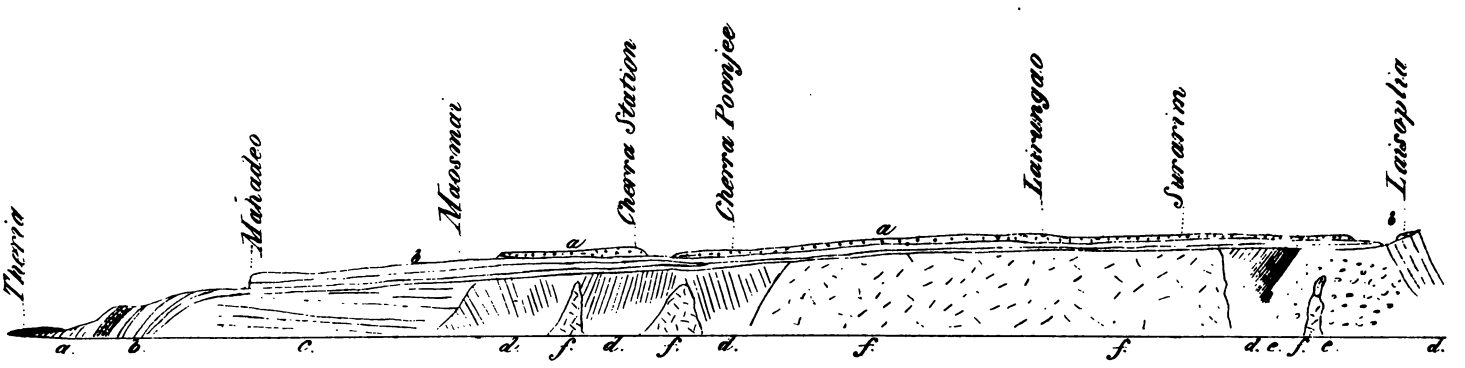
* Crawfurd's *Embassy to Siam.*

It would appear that those pieces of shell that fall beyond where the egg has struck are the representatives of spirits that are not implicated in the matter in hand; while those pieces that fall near the operator indicate that the sickness is due to natural causes.

The prevailing belief being that sickness is caused by dæmoniacal agency, the people sacrifice fowls, pigs, etc., to propitiate the molesting spirit; and it is usual for them to inspect the liver of the victims they offer, for indications or omens of the acceptance or rejection of the sacrifice.

Though there are several other topics of interest that might be mentioned in connection with the manners and customs of the people, I have not time to do so on this occasion. There is, however, one strange custom, called "Tarroo," which will, no doubt, be recognised as analogous to a custom prevailing among some other rude races. An unfortunate individual is supposed to be in league with a dæmon, and, in order to clear his character, he has to throw away every vestige of property he possesses, and begin life anew. He is deserted by everyone until his restitution is accomplished. The abuse of such a custom is unlimited, and it will be seen that it offers a ready means of effecting the ruin of anyone of whom two or three persons may be jealous.

In bringing this short *resumé* of the Khāsi customs to a close, I may just remark that I have not succeeded in finding an ethnological theory of the people. The anthropology of the Indian Hill Tribes is as yet but little investigated. It is probable they have all descended from a common source, and their characters have been subjected to powerful modifying influences on every side.



Geological Section from Theria to Laisoplia Hill through Cherra Poonjee. — Medlicott, Geol. Survey of India.

Scale 2 miles = 1 inch.

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a. *Nummulitics*
b. *Cretaceous*
c. *Silhet Trap*
d. *Shillong Series*
e. *Khasia Greenstone*
f. *Granite*

PHYSICAL GEOLOGY, ETC.

The length of the Shillong Plateau, from north to south, is about 250 miles, and the average width is about 25 miles. As a plateau, formed in most part of horizontal rocks, its position is remarkable, occupying, as it does, neutral ground in the acute angle between two great regions of special disturbance, the Himalayan on the north, and the mountain system that separates Bengal from the great valley of the Irrawaddi on the south-east.

The western portion of this district is known as the Gāro Hills, being inhabited by a half-civilised tribe of that name, of whom little is known, and who are averse to holding intercourse with strangers.* The eastern boundary of their country is the territory of the Jynteahs, Meekirs, and Nagas.

The Khāsi district may be said to extend, east and west, over one degree of longitude, and in a north and south direction, from the plains of Sylhet to the frontiers of Assam.

The geological section appended to this Paper is taken in a north and south direction, along the Shillong Plateau. At the southern extremity, cretaceous strata rest undisturbed upon metamorphic rocks. This sequence is invariable throughout its entire length, until we approach the borders of Assam, where the metamorphic strata present an unbroken ridge.

At Cherra Poonjee nummulitic rocks repose on the cretaceous, and after a short intervening gap, the result of denudation, continue in an unbroken range to the northward.

The alluvial deposits, which are indicated at the southern end of the section, often attain considerable proportions; and

* Major Austen contributes a Paper on the Garos, in vol. xliii., *Journal Royal Geographical Society*. London, 1874.

all along the south escarpment there is an extensive series of earthy deposits, probably of deltaic origin.

The range forming the southern edge of the great plateau rises abruptly from the plains of Sylhet, and presents all along its face a remarkably regular outline, but few points overtopping the general ridge, and the uniformity of contour only broken by an occasional glen or deep valley. This southern escarpment attains a height of 3,500 feet, and the highest peaks some 5,000 to 5,400 feet. The slopes, from base to summit, are generally closely wooded, but all forest growth ceases abruptly when the level of the table-land is reached; the want of protection against the prevailing winds is probably the reason.

Intersecting the plateau are numerous deep, narrow, cañon-like gorges or valleys, along which the streams find their way to the plains below. At Cherra Poonjee the water-course is no less than 3,000 feet below the level of the station. And it would be difficult to find more magnificent instances of the power of disintegration and removal of solid strata that sub-aërial forces may exert under favourable conditions, than is afforded by these deep, sinuous gorges. In outline these valleys closely resemble each other, the upper portion of their sides being composed of horizontal strata of nummulitic and cretaceous rocks, superimposed unconformably upon granite, gneiss, trap, or metamorphic formations.

All along the southern escarpment there are abounding evidences of extensive marine denudation. At one time these bold bluffs or headlands, now jutting on to the Sylhet plains, formed a coast line; and there are extensive deltaic and estuarine accumulations, though now covered with dense jungle, and scarcely known.

The enormous rainfall of these hills is mentioned in an article on Weather, in *Blackwood's Magazine* for November, 1875, and it is not easy for us, who live in a country the

annual rainfall of which is some thirty or forty *inches*, distributed with some equality over the whole twelve months, to estimate the immensity of the forces that are brought into action when, as it sometimes happens, thirty inches of rain falls in twenty-four hours, and when, during the four or five months of the rainy season, the downfall is said to be fifty *feet, = six hundred inches!*

Dr. Oldham says,* "I took an opportunity of visiting one of the streams in these hills after a heavy and sudden fall of rain; the water had then risen only about thirteen feet above the level at which it stood a few days previously; the rush was tremendous; huge blocks of rock, measuring some feet across, were rolled along with an awful crashing, almost as easily as pebbles in an ordinary stream. In one night a block of granite, which I calculated to weigh upwards of three hundred and fifty tons, was moved far more than a hundred yards; while the torrent was actually turbid with pebbles of some inches in size, suspended almost like mud in a rushing stream." But rain water exerts its denuding forces, not only on the surface of the plateau, or where, in rushing over the scarps, it excavates deep valleys and basins; it also permeates the upper strata, and hollows out subterranean channels in the nummulitic limestone, and springs from the face of the rocks at different levels, tearing away vast masses, and hurling them into the valleys below. To this solvent action of rain water is to be attributed a singular rounded, "*roche moutonnée*," outline of the surface, such, as Lyell observes, as is characteristic of glacial action.† The disintegration and mechanical removal of the limestone has caused a subsidence of the superincumbent strata of this unusual kind, and it is worth the very careful attention of geologists, being unique, and not mentioned in any

* *Memoirs Geological Survey of India*, vol. i., p. 174.

† Lyell. *Elements*, 6th Edition, page 140.

geological manual that I have seen as a phenomenon of denudation.

A peculiarity in this section is that the tertiary and cretaceous formations bend down rapidly at its southern extremity. They may have been deposited so on a natural slope, and the beds in question thin out in that direction. This feature is very noticeable in the cretaceous group. The nummulites are so greatly denuded as not to show it distinctly.

The *Nummulitic Formation* plays a far more conspicuous part than any other tertiary group in the building up of the earth's crust, whether in Europe, Asia, or Africa.* It sometimes attains a thickness of several thousands of feet, and extends from the Alps to the Carpathians, and is in full force in Northern Africa. It was largely quarried in Egypt for the building of the Pyramids, and may be traced thence into Asia Minor, and across Persia by Baghdad to the mouths of the Indus. It occurs not only in Cutch, but in the mountains of Scinde, and Caboul. And it is seen here in fine sections in North-Eastern Bengal, from which it may be traced to the frontiers of China. Nummulites have been found at as much as 16,500 feet above the sea level† in Thibet, and Sir Charles Lyell speaks of their abundance on the flanks of the Pyrenees.

When we reflect upon the fact that nummulitic strata enter into the constitution of the highest parts of the Himalaya Range, and of other mountain chains besides, we are struck with the comparatively modern date to which some of the greatest revolutions in the physical geology of the globe must be referred. The great Himalaya system could have had no existence till after the middle eocene period of geology. During that period the sea prevailed where these

* Lyell. *Elements*, 6th edition, page 305.

† By Dr. T. Thompson.

chains now rise, for nummulites, and their associated testacea, were unquestionably a marine fauna. A noticeable circumstance in this section is, that it shows the superposition of undoubted nummulites upon strata, the facies of which is cretaceous, and no stratigraphical boundary has, as yet, been detected.

Upon the Paleontology of the nummulitic series, Dr. Stoliczka has given the following note: — "*Operculina canalifera*, D'Arch., and *Nummulites Lamarcki*, D'Arch., are very common; besides these, fragments of a *Trochocyathus*; *Stylocœnia Vicaryi*, Haime; *Echinolampas spheroidalis*, D'Arch., a small *cardita*; *Pecten*; *Natica Rouaulti*, D'Arch.; *Keilostoma marginatum*, Lam.; a *Ziziphinus*; the small *Cerithium Hookeri*, D'Arch., casts of large *Natica*, *Cerithium*, *Terebellum*, etc. At Cherra Poonjee,—*Num. Lucasana*, and *N. Ramondi*, *Echinoids*, etc. The earthy Garo limestone is made up of a mass of *N. granulosa*, D'Arch., in various styles of growth."

The Cretaceous Series.—Mr. Medlicott, in reviewing this formation, says—"It would scarcely be possible to make anything like an exact lithologico-stratigraphical scale of the cretaceous deposits around Cherra Poonjee. Small as is the length of the section, and considerable as is the total thickness, there is no character constant in, or to, any one horizon. The series may be said to be sandy throughout; but the varieties are very numerous, and their distribution is most inconstant. The nature of these deposits, and their unassorted condition, would seem to be owing to the proximity of the area of erosion from which they were derived. The thickness changes from 1,200 feet, at the scarp of the plateau, to 670 feet, under the station of Cherra. At a point ten miles from the scarp, where the nummulitic beds make their last appearance, there is only about 100 feet of cretaceous sandstone."

As indicated on the section, the surface of the pre-cretaceous rocks is remarkably even, and probably had a similar contour to the present surface.

The difficulty that has been felt in any attempt to assign a definite horizon to the nummulitic and the cretaceous deposits is attributable not only to the general similarity of composition and of arrangement, but to the fact that between the two known fossiliferous rocks in each there is a band of 200 feet in thickness, in which no fossils have been found, save some vague stem-like impressions which might belong to either formation.

The bottom rock of the cretaceous series is a coarse conglomerate, superimposed on several sandstones.

Dr. Stoliczka reports having found in the highest band of the series, *Pelecypoda*, *Cellepora*, and *Astrocænia*; middle series, *Nautili*, *Ammonites*, *Anicoceras indicum*, Forbes; *Anis subcompressum*, Forbes; *Alaria*, *Rostellaria*, *Tritonidea Requieniana*, d'Orb., *Exogyra Matheroniana*, d'Orb., *Inoceramus*, *Rhynconella*, *Pecten*, and many well-known types.

The Silhet Trap is extensively shown all along the southern scarp of the Khāsi Hills. Nothing can be said of its age, except that it is certainly pre-cretaceous. It is stratified, and of various composition in different localities. A formation of such great thickness must have had a wide horizontal range; it would seem that we have its northern limit indicated on the section. How far it may stretch away to the south beneath the present delta of the Bay of Bengal, being buried beneath the remains of the newer deposits, we cannot even surmise. It is equally concealed in the east and in the west, in the one direction by the continuous overlapping of cretaceous rocks, and in the other, as far as is known, by similar deposits. The trap appears to have had a northern flow of 10° to 15°, and its estimated depth here is 300 feet.

Its area may be said to be coextensive with the vast area of disturbance in which it is found, and all the indications observed are in favour of the hypothesis that this area was also one of subsidence.

The Shillong series consists of quartzites, slates, and schists. The series has been very little explored. The quartzites are the best known, being conspicuously weathered out in many of the ridges. There still remains to be noticed—

The Granite: It contains pale pink orthoclase in large crystals, also oligoclase, and an abundance of hyaline quartz, and mica. In no instance has it been found to penetrate into the sedimentary rocks, or to produce dykes. It disintegrates very rapidly, and for a depth of many feet from the surface is soft and incoherent. Iron, in crystalline forms, is abundant, but is not found in veins. Mr. Medlicott is of opinion that the granite is younger than the trap. The line of greatest elevation caused by the granite, or rather by the forces of which it is the index, had a direction east and west.

This review of the geology of the region leads to the inference that the general basis of the series of formations is granitic, and that each subsequent deposit has been extensively denuded. There would appear to have been a gradual and continuous depression of the surface during the deposition of the entire series, which have subsequently been elevated to their present position. The main line of disturbance is thought by Dr. Oldham to be synchronous with that observed in other parts of Bengal and Central India.

The enormous rainfall of the southern portion of the plateau is accounted for by the sudden resistance offered by

the wall-like escarpment to the rain clouds which pass over the plains of Sylhet, laden with moisture derived from the Bay of Bengal, and which, consequently, at once precipitate their accumulated vapour in deluges of rain. As we travel northwards, the rainfall rapidly decreases in amount.

In the paper by Dr. Oldham, the coal-bearing strata are referred to at considerable length, and he anticipates the time when they will be profitably worked, and when modern civilisation shall penetrate this interesting region.

Such is a brief sketch of the Khāsí people and the territory they inhabit; and both present so many interesting points for study, that it is to be hoped, as attention is more and more directed to them, it will not be long before we receive from other observers additional contributions to our knowledge concerning them.

ON REPETITION AND REDUPLICATION IN LANGUAGE.

By J. NEWBY HETHERINGTON.

If, as Plato says in his *Theætetus*, wonder is the source of all philosophy, then we need not be surprised that the great problem of human speech has engaged the attention of so many of the wisest of men. From the first dawn of intelligence men have wondered at this marvellous gift, and even amongst the most barbarous tribes legends have been found which attempted to explain its origin. But for long ages men were content with wonder, and the philosophy which it gave rise to was of so vague and uncertain a character that it was but of little practical use. Here, as elsewhere in scientific enquiry, the old deductive system was all-powerful, and men first formed theories and then tried to make the facts agree with those theories; much in the same way, I imagine, as the Frenchman in the story, who, on being told that the facts of a case did not agree with a certain ingenious theory of his, answered, "So much the worse for the facts." But a brighter era has now dawned, students of the science of language, as of every other science, have found that they must master the facts before they build up theories; they must investigate details before they proceed to deductions; they can afford to neglect no detail, however trifling it may seem at first sight; and it is only after years of patient toil, in the valleys and on the plains, that they dare to ascend to the hill-tops, and overlook the whole boundary of their science. Such a survey is granted only to a chosen few, and even to them much remains doubtful. As they speak to us of the origin, growth, and development of

language, the mystery seems almost as mysterious as ever; many perplexing problems remain still unsolved, and the wisest and most learned have to confess that "one question leads to another, until all things end in a mystery."

But whilst these loftier problems are so abstruse, and can be attempted by so few, there are many minor points which are open to any careful student, and which cannot fail to interest all who have ever felt that enquiring wonder which is the parent of all philosophy. It is to one of these minor problems that I wish to call your attention in this Paper, and in doing so I cannot lay claim to any great amount of originality; the facts and instances I shall bring forward have been noticed by others, but have not, I think, been grouped together in the same way. Either a portion only of the subject has been treated of, or the whole matter has been too lightly passed over.

I have long thought that repetition, reduplication, tautology, or cumulation — call it by what name we will — is a most important element in language, and that its importance has not been sufficiently recognised. It has been alluded to by most philologists, and in some instances short treatises have been devoted to the subject, as, for example, *The Glossary of Reduplicated Words in the English Language*, by Mr. Wheatley, published in the *Transactions of the Philological Society*, and a remarkably interesting paper by the Rev. J. Earle, published in *Macmillan's Magazine* for November, 1874. Still, most writers have only taken one class of reduplications or repetitions, and have scarcely as much as suggested a plausible reason for them. I propose to give some examples of repetition, not merely as we recognise it in the form of tautology in writing and speaking, but also as a formative element in language, forming words themselves, and more especially adding to their inflections

and derived forms. I shall endeavour, as far as possible, to draw my examples from the English language, and this for various reasons; first, as being the most easily understood; again, because I think that there is scarcely a single philological principle which may not be illustrated by it; and especially because any attempt at illustrating my subject from other languages would far outrun the limits of a single paper.

And here, at the very outset, let me state that I believe that this repetition or reduplication has generally been brought about by a desire for clearness and intelligibility; a wish to make everything superfluously plain even to the meanest intelligence; "to make assurance double sure"; in short, the principle at work is, as I take it, EMPHASIS.

By repetition or reduplication, as a formative element in language, I mean any formation wherein the self-same thing is twice said, being repeated either in the same form or with a change of form; in every case it is a heaping up of forms to express that which is conveyed by each of the accumulated parts, as in such an expression as "most highest," or as in one I have just made use of, viz., "self-same." How universal this tendency is, and how thoroughly it has established itself in various forms of language, will be best seen if we run through the parts of speech, and find it in every one.

In the first place, I wish to bring forward some examples of repetition in inflections. Now, inflections have been called "changes of form to mark changes of meaning," and they mostly consist of suffixes, which apparently are arbitrary and meaningless, but which in reality are the remains of other words,—pronouns, prepositions, auxiliary verbs, and the like. Many modern languages, and especially English, get rid of these inflections to a large extent. At times, however, the old form is retained, though it has lost much of its

significance, and a newer form is added to make the meaning clearer. Thus in old English, *-ster* was a common ending to mark the feminine, and we still retain it with part of its old force in *spinster*. Up to the end of the thirteenth century, *-ster* was a characteristic sign of the feminine gender, and by its means new feminines could be always formed from the masculine, *e. g. baecestre, hearpestre,* and a very curious form, *belleringestre*. In the fourteenth century, we find the suffix *-ster* giving place to the Norman-French *-ess,* and there is consequently a want of uniformity in the employment of this termination. Robert of Brunne, 1325, uses *sangster* as a masculine; and eventually *-ster* came to denote the agent or doer of an action, though a good number of nouns with this suffix are to be found as feminines late in the fifteenth century.

Now when *-ster* was losing its original power, the meaning of the word was emphasised by adding the Romance suffix *-ess,* and such new words were formed as *songstress* and *seamstress,* which are etymologically double feminines.

In the English language we can also find many instances of double or reduplicated plurals; the most noteworthy are *children, brethren,* and *kine*. In the oldest English *child* (*cild*) formed its plural by strengthening the base by the letter *r,* and adding *u,* a common plural ending. So in the twelfth century we find *cildru,* which was changed to *childre,* and which still survives in the form common in many northern dialects, *childer*. When this was losing its force as a plural, *en* another plural suffix was added, and thus the modern *children* was formed. The history of *brethren* is similar; first we have *brothru* as the plural of *brother,* then *brethru* and *brethre,* lastly *brethren*. I may note here that Chaucer uses such forms as *daughteren* and *sustren*. *Kine* has been formed in a similar way; the old English *cu* formed a plural *cy,* by vowel change, just as *mus* formed *mis,* and then

we find *kye* and *kyne*. But it is in dialects that we find some of the most curious instances of double plurals; and this shows that in any linguistic enquiry we can never afford to neglect those out-of-the-way forms of speech which are so rapidly dying out before the literary and cultivated idiom. In some English dialects even the ordinary *s* or *es* of the plural is repeated; thus a Devonshire man will say *bellowses* for *bellows*; in Cumberland I have often heard *wayses* for *ways*; but it is in Sussex that this form is most frequently to be met with; there we find such words as *posteses*, *beasteses*, *treeses*, *ghosteses*, and *wristeses*.

Turning to the cases of nouns, we do not find so many instances of repetition as in other forms, still the principle is at work; wherever the preposition *to* is used with a noun or personal pronoun, as in "I gave it to him," in the place of the old dative case, there is redundancy. Perhaps, however, the most marked instance is in connection with the possessive case, which in part supplies the place of the old genitive in English. We only use the *'s* of things with life, and in all other instances express the old genitive by means of the preposition *of* followed by the noun. During the last two hundred and fifty years, however, a new form has grown up, and both *of* and the *'s* are used, *e.g.* "the king's picture" may mean either "a picture of the king," or "a picture of the king's." The latter is in reality a double or cumulative genitive, and, since it expresses a different shade of meaning, is a most useful phrase. Its origin is obscure, and this is not the time to discuss it; the oldest instance of its use with which I am acquainted is in the authorised version of the Bible, "*How many hired servants of my father's.*"

Now in all these cases the process is the same; the old inflection partially loses its power, and the same or a similar one is added to emphasise the meaning and make it clearer. Nor is it in gender, number, and case only that repetition is

to be met with in nouns; in words like *upholsterer* and *fruiterer* the formative element is repeated; and there are cases in which, without a repetition of form, there is repetition in the sense; thus in the Bible of 1611, a catcher of fish is called a *fisher*, but this has long been superseded by *fisherman*.

In adjectival forms repetition is to be found, just where we might have expected to find it, namely, in the degrees of comparison, where emphasis is of the greatest importance. The terminations *er* and *est* have gradually given way before the words *more* and *most*, and at one time the two forms were used together. Most students of Shakspere and other Elizabethan writers must have noticed how common double comparatives and superlatives are, such as "*more better*," "*more braver*," "*more elder*," &c. Amongst a very great number, I may instance:

"A more larger list of sceptres."
Anthony and Cleopatra, iii. 6. 76.

"The most unkindest cut of all."
Julius Cæsar, iii. 1. 121.

"To some more fitter place."
Measure for Measure, ii. 2. 16.

In the authorised version of the Bible we have "*the lesser light*," *lesser* being a double comparative; and the word "*nearer*" is another instance, for although we use *near* as a positive adjective, it is really an old comparative, *neâr* or *nyra* being the comparative of *neâh*, the same as our word *nigh*. Shakspere uses *near* as a comparative adverb, "*The near in blood, the nearer bloody*."—*Macbeth*, ii. 3.

But by far the most remarkable instances are to be found in such superlatives as *foremost*, *inmost*, *utmost*, &c. The suffix *-most* is not, as might be supposed, the word *most*, but a double superlative ending. There was an old ending *-ma*, which corresponded to the Latin *-mus* in such words as

infimus, extimus, and the old English superlatives were *forma, innema, utema;* but when the ending *-est* became almost universal, it was added to the old superlatives, and so we got such forms as *forma-est, formest, formost, utemest, utmost* or *uttermost,* and many others. Double comparatives and superlatives are not unknown in other languages; they are to be found both in Greek and Latin, though rarely among writers of the classical period; in mediæval Latin they are very numerous, examples are, *postremius, postremissimus, minimissimus.*

But not only are double comparatives and superlatives formed by repetition of the formative element, but in some cases comparison itself is achieved by a simple repetition of the positive. In some languages, the repetition of the simple adjective does duty as a superlative; this is the case to a great extent in Hebrew. The Breton, too, from *mâd,* 'good,' has *mâd mâd,* 'best,' from *fall,* 'bad,' *fall fall,* 'worst'; and Shakspere found an expressive superlative in *wonderful wonderful*—"O wonderful, wonderful, and most wonderful wonderful, and yet again wonderful."—*As You Like It,* act iii., s. 2.

So, again, the French have the term *bon-bon,* translated by English children into *goodie-goodie.** This is perfectly intelligible; for as the simple adjective *good* makes a selection out of all that is good, bad, or indifferent, so a second selection may be made out of the category *good,* and thus we arrive, at any rate, at a class *very good;* and by a similar process we may hope to arrive at the highest degree of goodness, that is, the best. Here, as elsewhere, emphasis does its work by repetition.

Occasionally, in English, we find adjectives with a double termination, such as *philosophical, tragical, political;* in such cases, however, the different words often acquire a

* T. Hewitt Key. *Language, its Growth and Development,* p. 148.

different meaning, as in *politic* and *political*. Sometimes the repetition is more marked, as in such compounds as *four-square* and *self-same*.

Amongst pronouns reduplicated forms are not common, still they are to be found. I think that the use of the so-called emphatic compounds, *myself*, *himself*, is a case in point. In such phrases as *I myself*, *thou thyself*, &c., the pronoun is repeated for the sake of emphasis; and I am told that in Welsh repetition of the personal pronouns is very common. In old English relatival phrases repetition is frequently to be found, and this probably arises from the fact that *who*, *which*, and *what* were originally interrogatives, and, when first used as relatives, had their meaning emphasised by placing the older relative *that* after them. I give some examples:—

"To Venus, whos prest that I am."
Gower's *Confessio Amantis*.

"Whom that I toke wyth all my plesaunce."
Hawes.

"The Abbot which that was an holy man."
Chaucer. *Prioresses Tale*.

"These yatis (gates) which that ye beholde."
Skelton.

"Spite of his spite, which that in vain
"Doth seek to form my fantasy."
Ingelend, A.D. 1560.

This leads me to notice a somewhat similar construction with the conjunctions *when*, *where*, and *why*. At one time the conjunction *that* was placed after them, just as the relative *that* followed *who* and *which*, and the reason, no doubt, was the same, to mark the fact that they were not used interrogatively; *e. g.*:

"When that the poor have cried."
Julius Cæsar, iii. 2. 96.

"You may imagine him upon Blackheath;
Where that his lords desire him to have borne
His bruised helmet and his bended sword."
Henry V., v. Prologue.

"When that Areite to Thebes comen was."
Chaucer. *Knight's Tale.*

I now come to a somewhat difficult part of my subject, the part played by repetition or reduplication as a formative element in verbs. In many languages, and notably in Sanskrit, Greek, and Gothic, the perfect tense is formed by reduplication, or doubling of the first syllable of the stem. In Latin this is not so common, though it is to be found in such words as *dedi* and *cucurri*. The only marked example we have in modern English is in *do*, past *did*, though there is little doubt that the vowel change in many strong verbs is owing to a previous reduplication. In old English, the perfect of *do* was *dide*, in old Saxon *deda*, and this clearly shows the origin of the form. Now, if we take it for granted that this doubling of the root, or part of it, formed a perfect tense, without the use of any other formative element, even this goes to support my theory; for surely the expression of an action perfect or completed needs more emphasis than one incomplete and in course of execution.

But many think that the reduplication was not the sole formative element, but that a termination, which has in some cases been altogether lost, or of which only traces remain, gave the meaning of a perfected action or of past time. It would require too much time to discuss this question properly; the whole matter is very ably treated in the 13th chapter of the late Professor Key's work on *Language, its Origin and Development*. Certainly reduplication is by no means confined to perfects. We have in Latin such words as *sisto* and *gignosco*, and in Greek words like δίδωμι and τίθημι. In such words, and perhaps in the reduplicated

perfects, the clearer and more impressive conveyance of the idea was probably the sole object.

And now, if we leave the inflected parts of speech, and turn to the uninflected, we still find repetition. Amongst adverbs and adverbial phrases, the use of the double negative is the most remarkable instance. In Greek, we know that three, four, or even a still greater number of negatives may be used in one short sentence; and so it was in old English. In modern English grammars, we are taught that "two negatives destroy one another, or are equal to an affirmative." But this was not always the case in our language. The change was probably brought about by the Latin scholars of the Renaissance, who thought that whatever was Latinised was right; and in Latin the double negative never seems to have had a place. This we might have expected from the logical character of the language.

According to the strict rules of Logic, two negatives *are* equivalent to an affirmative, but for all that, in many languages, the instinct of speech and the desire for emphasis proved stronger than the logical faculty, and two or more negatives were used to strengthen the negation. The old English negative was *ne*, placed before the verb, and often coalescing with it, as in the expression, "*Will he, nill he,*" where *nill* = *ne will*. Often, for the sake of emphasis, *nâ* or *nân* was added after the verb, and so arose such phrases as "*Ic ne was na.*" We have dropped the former and retained the latter.

Previous to the time of Shakspere, the double negative was constantly used in English; Chaucer piles one on another with great profusion, as in the oft-quoted lines from the description of the Knight in the *Canterbury Tales:*

> He nevere yit no vilonye ne sayde,
> In all his lyf unto no manere wight,

which might be paraphrased, "He never did not say nothing wrong to nobody." Shakspere frequently uses the double negative, as in *Much Ado about Nothing*, ii. 1,

"Nor will you not tell me who you are,"

and in the *Merchant of Venice*, i. 2,

"Is it not hard that I cannot choose one nor refuse none."

Had this tendency gone on unchecked, we might at this day have made use of as many negatives as some Greek writers; but now it is only to be met with in some dialects, where, as in so many cases, the old forms of speech survive, and set at defiance the rules of modern grammarians. I have frequently heard in Cumberland such expressions as "I nivver said nowt to nea body." One curious result of this idiom in Elizabethan English was, that even when the verb only implied negation, a redundant negative often followed, as in such a sentence as—

"You may deny that you were not the cause."—*Richard III.*, i. 3.

Here *deny* is equivalent to *say not*, and then the negative *not* is repeated to give emphasis; so in the line—

"First he denied you had in him no right."
Comedy of Errors, iv. 2.

Occasionally we find prepositions repeated in old English, as in Chaucer's Prologue—

"And eek in what array that they were inne."

This construction is common in Elizabethan writers, especially when the verb is at some distance from the preposition with which it is connected; *e. g.*

"The scene wherein we play in."—*As You Like It*, ii. 7.
"But on us both did laggish age steal on."—
All's Well that Ends Well, i. 2.

"To what form but that he is, should wit, larded with malice, turn him to."—*Troilus and Cressida*, v. 1.

But, besides cases like these, there is repetition, though at times unconscious repetition, when a preposition follows a verb compounded with the same particle, or with one having a similar meaning; thus we speak of "*engraving on wood*," and in America men say now, as our ancestors used to say here in England, that they "*admire at*" something.

Amongst conjunctions redundancy is very frequent; in Greek every one knows how the particles are piled up till they are almost untranslatable; and even in English we are familiar with such forms as "*from thence forth*," and "*for because*." A curious phrase often met with in Shakspere is worthy of note here; it is the form "*or ere*," meaning *before*, as in "dying or ere they sicken." (*Macbeth*, iv. 3.) "*Or*" and "*ere*" are really the same words, and are both from the old English "*aer*," *soon*, which still survives in *early*; the comparative was *aerer*, and the superlative *aerest*, which is familiar to us in the form *erst*; the comparative *aerer* was used adverbially, and was contracted into "*or*," and sometimes "*ere*." At first *or* was used alone, as in Ascham's *Scholemaster*, "or he have construed," but afterwards, when it was losing its force, "*ere*" was added. It has been conjectured by some that "*ere*" is a corruption of *e'er* and *ever*, but this is hardly likely, since *e'er*, as an abbreviation of *ever*, is rare in Elizabethan English, and the other interpretation gives a clearer meaning in every case. Other instances from Shakspere are:—

"I would
"Have sunk the sea within the earth, or ere
It should the good ship so have swallowed."
Tempest, i. 2.

"I drink the air before me, and return
Or ere your pulse twice beat."
Tempest, v. 1.

A very similar example is afforded by the phrase "*an if*" or "*and if*," so common in Elizabethan English. *An* or *and*, meaning *if*, was frequently used with the subjunctive, and there has been some controversy as to its origin. The general opinion seems to be that it has nothing in common with the copulative *and*, but is derived from the imperative mood of *annan*, to grant, just as *if* was originally the imperative mood of *gyfan*, to give. Mr. Abbot, however, says (in his *Shakspearian Grammar*) that the two words are identical, and that it was the subjunctive mood following which gave the hypothetical force to "*an*" and "*and*." But whichever theory be correct, it is certain that "*an*," with the subjunctive, had the force of "*if*," as in the following passages:

"They will set an house on fire, an it were but to roast their eggs."
Bacon's *Essays*.

"Alcibiades bade the carter drive over, an he durst."
North's *Plutarch*.

It is this word, and not the copulative *and*, which is meant in the old rhyme:—

"If *ifs* and *ans* were pots and pans,
There 'd be no trade for tinkers."

In time, when the subjunctive mood was not so freely used, and when *an* hypothetical, and *and* copulative, were in danger of being confused, *if* was added for the sake of clearness and emphasis, *e.g.*

"It dies, an if it had a thousand lives."
1 *Henry VI.*, v. 4.

"What an if
"His sorrows have so overwhelmed his wits."
Titus Andronicus, iv. 4.

"An if they live, I hope I need not fear."
Richard III., iii. 2.

"Or by pronouncing of some doubtful phrase,
As, 'Well, well, we know,' or, 'We could an if we would';
Or, 'If we list to speak'; or, 'There be an if there might.'"
Hamlet, i. 5.

One more instance of this kind of redundancy; *but*, when used adverbially, generally means *only*, and, in Elizabethan English, we often find both words used, as

"He only lived, but till he was a man."
Macbeth, v. 8.

"My lord, your son had only but the corpse."
2 *Henry IV.*, i. 1.

I have now gone through the various parts of speech, and noticed some of the more remarkable instances of repetition and accumulation in each; in those that admit of inflection, repetition of the formative element is, as we have seen, constantly occurring; sometimes, as in verbs, the stem itself or a portion of it is doubled; in the uninflected parts of speech the word itself, or one of similar meaning, is repeated. In every case, as it seems to me, there has been a desire for emphasis and additional clearness. Sometimes, as in the case of the double negative, the double superlative, and even the reduplicated perfect, this scarcely admits of doubt; wherever the same word or syllable is repeated, it must have been done for the sake of emphasis. In other cases, where the same meaning is repeated in another form, this is not quite so clear; the one element had undergone a partial decay, and had lost some of its force before the other was added; still I believe that all the meaning had not passed away from the one when the other was joined to it, and that, therefore, we may account for all by the one main principle of emphasis. For example, *-ster* was still used as a feminine suffix when the new suffix *-ess* was added to form such words as *seamstress*; but there was a consciousness that the fact that the word was feminine needed emphasising.

A very good illustration of a similar process is afforded by many names of places, especially in our own country; different races have succeeded one another in Great Britain, and each has left behind it relics of its language on the map. In many instances these names have been piled one upon another like the rocks in a stratification, and in most cases the same idea is repeated in two or more forms of speech. Take, for instance, the Cotswold Hills; they are so called from the British *coed*, a wood, and the old English *wold* or *weald*, which means the same thing. In Devonshire, near Exeter, Pinho is composed of Keltic *pen*, and English *how*, both meaning a height.* A very remarkable instance of this sort of repetition is given in Garnett's *Philological Essays*:— "At the head of the Yarrow is a mountain, called of old by the Keltic name, 'Ben Yair.' To this the Romans prefixed their '*Mount*' or '*Mont*,' and the Danes afterwards added their '*law*.' The hill is now called 'Mount Benjerlaw;' in it *hill* comes three times over."†

Perhaps, however, *law* may have been an old English word, and *Mount* may not have been added till after the Norman invasion; but in either case the principle is the same. Wansbeck Water is another very good example of the same peculiarity; *wan* is a Keltic element, meaning *water*, as in *Wansford* and *A-von*; *beck* is Scandinavian, and *water* is English. In Cumberland there is a village called Torpenhow, each of the three syllables meaning *hill* or *height*. *Pen-hill*, in Somersetshire, and *Pen-law*, in Dumfriesshire, are analogous compounds. In *Pentlow-hill*, in Essex, we have the Keltic *pen* and Anglian *law*, and the modern English *hill*. The *Ouse-burn*, a stream which runs into the Tyne, presents the English *bourne*, added to a modification of the Keltic *uisge*, water.

* Rev. J. Earle, in *Macmillan's Magazine*, vol. xxxi., p. 47.

† *Sources of Standard English*. J. L. Kington Oliphant, p. 41.

Hundreds of examples similar to these might be given, but these must suffice. The usual explanation given for such names is, that the repetition was unconscious, that each addition sprang from an independent impression of the natural object in each instance, and that when the new element was added the old one had become totally unintelligible. Perhaps, in some instances, this was the case, but I cannot help thinking that the authors of the new form were frequently more or less aware of the meaning of the old term, and wished to make it clearer; that, for example, when Windermere Lake was first spoken of, men had not entirely forgotten that *mere* meant *lake*. Without making any positive assertion on this point, or claiming these instances as proofs of my theory, I may look upon this notion as, at any rate, probable.

But, besides proper names, there are a great number of words in the English language formed by reduplication. A great number of these are not to be found in the cultivated literary speech of to-day, but must be sought for in dialects and amongst old authors. Mr. Wheatley, in his *Dictionary of Reduplicated Words*,* gives a list of nearly six hundred, and these probably come far short of the whole number.

Many of these reduplicated words are of an onomatopoetic character, and are purely imitative of the sound or meaning intended to be represented; as, for instance, *murmur*, *cuckoo*, *ding-dong*, *cling-clang*, *rat-tat*, &c.

In Latin, we find such forms as *susurrus* and *tintinnabulum*, both clearly imitative, and in Greek there is *βάρβαρος*, imitative of stammering or indistinct utterance. Now, although imitation may be said to be the main principle at work in these and similar words, yet we may notice that in many instances the single element is imitative, and the repetition increases and adds force to the resemblance; it,

* *Transactions of the Philological Society*, 1866.

as it were, calls attention to the fact that the word is markedly imitative.

There are, however, a very great number of reduplicated words which are not imitative at all, and which must be considered separately. Some few, like the imitative *murmur*, repeat the simple element unaltered, but in the majority of cases one portion is slightly varied, the latter part of the compound generally being the primitive element.

Mr. Wheatley divides such words into three classes:—

First. Those in which the body of the word remains the same in both portions, but the initial letter is changed, such as *namby-pamby, roley-poley, hodge-podge, hubble-bubble, hurley-burley.*

Second. Those in which the initial letter remains the same, but in which there is an internal vowel change in one portion. These are usually formed by the interchange of *i* with *a* or *o*, as *bibble-babble, chit-chat, ding-dong, sing-song, dilly-dally, nick-nack.*

Third. This is a very small division, and contains those words in which one or more letters is added to the second portion of the compound for the sake of euphony, as in the Lowland Scotch *argle-bargle.*

There can be no doubt that rhyme or assonance, the pleasant jingle of sounds, has had much to do with the formation of many of these compounds. There is a natural tendency to rhymed sounds, for "we like what is like"; and, even as an addition to poetry, rhyme is older than is generally admitted. But there is something more at work than rhyme in the majority of reduplicated words, and that something is emphasis. I have already stated that in the greater number of such words the second portion is the primary element, and the first part of the word is a mere prefix, used only for the purpose of strengthening or intensifying the meaning. Thus *chit-chat* is from *chat, dilly-dally*

from *dally*, *hurdy-gurdy* from *gurdy*, probably a corruption of the Italian name of the instrument, *ghironda*; *shilly-shally* from *shall*, *tittle-tattle* from *tattle*; in all these, and in hundreds of others, the formative principle is the same; thus, instead of saying very weak or washy, we say *wishy-washy*, altered from *washy-washy*.

In some instances, the primary element comes first, as in *roley-poley* from *roll*, and *handy-pandy* from *hand*; but these cases are not very common; still the principle is the same, only the intensifying element comes last.

It would be easy to say that such words are childish, vulgar, or the like, and ought not to be admitted as evidence of any linguistic principle; but we must never forget that so-called childish and vulgar, that is, provincial words, often throw the strongest light on many of the most perplexing problems in philology; children, in learning to speak, often unconsciously imitate their far-away ancestors who first elaborated language. If, however, authority were needed for the use of reduplicated words, it need not be sought for long; witness some of the following quotations:

> "They heard a noise of many bag-pipes shrill,
> And shrieking *hubbubs* them approaching nere,
> Which all the forest did with horrour fill."
>
> Spenser's *Faerie Queene*, iii. x. 43.

> "An universal *hubbub* wild
> Of stunning sounds and voices all confused,
> Borne through the hollow dark, assaults his ear
> With loudest vehemence."
>
> Milton's *Paradise Lost*.

> "When we have dashed them to the ground,
> Then defie each other; and, *pell-mell*,
> Make work upon ourselves."
>
> Shakspere. *King John*.

"Confounding, *pell-mell*, her own traditions with God's Word; her own merits with Christ's."—*Bishop Hall*.

"His wit all *see-saw*, between that and this;
Now high, now low, now master up, now miss,
And he himself one vile antithesis."
Pope. *Prologue to the Satires.*

"Such continual *zig-zags* in a book,
Such drunken reelings have an awkward look."
Cowper. *Conversation.*

"The Paris Exhibition of 1867 is to be the ideal of French skill in their own art of classification. In London, our principle of arrangement was the great *higgledy-piggledy* plan.—*Saturday Review*, June 2, 1866.

If we turn to other languages, we shall find abundant examples of reduplicated words; sometimes the same or a similar word runs through several languages; thus we find *zig-zag* in English, French, and Italian; *zick-zack* in German; *sick-sack* in Swedish; *cig-zaque* in Spanish, and *zyg-zag* in Polish. In French, we find such words as *bric-à-brac*, *ci-ça*, our *see-saw*, and *tric-trac*; in German *fick-facken*, to play tricks, *hokus-pokus*, as in English, *kling-klang* and *misch-masch*. In Dutch, *kikel kakel*, idle chatter, and in Danish *rips-raps*, our *riff-raff*.

Indeed, similar reduplications are to be found almost universally; in Arabic, I believe they may be formed almost to any extent; and they are to be found in Gothic and Sanskrit. But if we wish to see repetition exercising its full force, we must examine lists of words from the languages of savage tribes; for savages are the children of humanity, and their rude and barbarous idioms often tell us more of the secrets of philology than the most polished languages that ever enshrined an immortal literature. "In fact, in the early stages of language," says Professor Hewitt Key, "there seems to have prevailed a general fondness for repetition, but without attaching to it any grammatical idea. The sole object was the clearer, perhaps the more impressive, convey-

ance of the idea. Thus, in South America, we find a river *Bio-bio*, a lake *Titi-caca*, a rodent *Tuco-tuco*. So, too, the New Zealander's vocabulary swarms with substantives, adjectives, and verbs, of such formation as *mati-mati* 'toe,' *emi-emi*, 'tree,' *kiri-kiri*, 'gravel,' *motu-motu*, 'embers,' *ange-ange*, 'then,' *koro-koro*, 'loose,' *áko-áko*, 'to split,' *aki-aki*, 'to urge,' *ati-ati*, 'to drive away.' Our own ears are familiar with such forms as '*talkie-talkie*,' and we seem to find them of especial value in our dealings with barbarous nations."* Instances similar to those furnished by Professor Hewitt Key might be found in almost every dialect of the North American Indians; Longfellow's *Hiawatha* would alone furnish many examples; in Australia, we find such names as *ka-rong-ku-rong*, a pelican, *ki-ru-ki-ru*, the king parrot, and *kong-kung*, a frog. In Chinese, reduplications are very common, and they have been adopted in that curious artificial idiom known as "pigeon English." A Hindoo constantly adds meaningless rhymes and repetitions to English words, and will talk of a "*button-bitten, kettley-bittley*."†

Repetition, then, is almost universal, and plays an important part in most languages, both in the formation of words and their inflections; but we may go further than this: not only are syllables and portions of words doubled, but words themselves, and even phrases, are repeated, generally for the sake of additional clearness and emphasis. In phrases like "*bag and baggage*," or "*part and parcel*," we scarcely notice that the second word is really a diminutive of the first, and in "*act and deed*," which, like "*part and parcel*," is a legal phrase, we are not conscious that the two words express very much the same notion. When such repetition is carried to excess, we call it tautology, or redundancy, and try to avoid it both in speaking and writing; undoubtedly the repetition

* *Language, its Growth and Development.* T. Hewitt Key, page 149.

† Farrar. *Chapters on Language*, page 265. Note.

either of the same word, or of the same idea in different words, is a sign of a faulty style, and offends our modern ears; yet the fear of tautology may be carried too far; and some writers, in order to avoid repeating a word, at times sacrifice clearness to their sense of elegance. In older English, however, redundancy was much more frequent, and, amongst the great prose writers of the Elizabethan and Stuart periods, many examples may be found of the species of repetition which consists in presenting the same idea under slightly varied forms. I give some instances from Hooker:—"It behoveth the very *foundation* and *root*, the highest *wellspring* and *fountain* of them to be discovered;" and again, "That which doth moderate the *force* and *power*, that which doth appoint the *form* and *measure* of working, the same we term a law;" and closely following this passage we have "Made *suitable*, *fit* and *correspondent* unto their end by some *canon*, *rule*, or *law*."

The following sentence, from Tillotson, contains numerous tautologies:—"Particularly as to the affairs of this world, integrity hath many advantages over all the fine and artificial ways of *dissimulation* and *deceit*; it is much the *plainer* and *easier*, much the *safer* and *more secure* way of dealing with the world; it has less of *trouble* and *difficulty*, of *entanglement* and *perplexity*, of *danger* and *hazard* in it. The arts of *deceit* and *cunning* do continually grow weaker, and less *effectual* and *serviceable* to them that use them."

So again in Addison—

> "The dawn is overcast; the morning lowers,
> And heavily in clouds brings on the day,"

these three clauses all express the same fact.

In Acts of Parliament and legal documents, synonymous words are joined for the sake of exhaustive completeness; so we get such phrases as "*use and wont*," "*means and*

substance," and in a Queen's Speech of a few years ago I find the expression, "*to refer back again.*"

At times, strong passion or emotion will cause speakers to become tautological, as in Chatham's famous Address, "I am *astonished,* I am *shocked* to hear such principles *confessed;* to hear them *avowed* in this house and in this country." Cicero's exultation over Catiline's discomfiture was expressed by the succession, "*Abiit, excessit, evasit, erupit.*"

As a rule, however, modern taste is not in favour of such repetitions; and it is desirable to avoid the multiplication of such tautologies as "*the first aggressor,*" "*the standard pattern,*" "*some few,*" "*the universal opinion of all men,*" "*to resume again,*" and many other similar phrases.

Sometimes the mere repetition of a word adds very great force to poetical expression. I know of no better example of this than the following lines, where the horror of being alone in the world is told with such force:

> "Alone, alone, all, all alone,
> Alone on a wide, wide sea!
> And never a saint took pity on
> My soul in agony."

When a redundant style is purposely employed, we call the figure a pleonasm, and at times, especially in poetry, we can afford to admire such expressions. As a rule, the more primitive a language is, the more it abounds in pleonasms, and some languages seem never to have thrown them aside. The various Semitic tongues are peculiarly rich in pleonastic forms of expression, and we have been familiarised with them through our Bible translation. In Hebrew, people not only speak, but open their mouths and speak; not only answer, but answer and say; do not merely go back, but rise up and return to the place from whence they came forth; and the

widow of Tekoah is not only a widow, but thinks it necessary to tell David that she is "a widow woman, and her husband is dead.* Again, as an example of repetition in style, take this passage from Exodus xxxii. 15—

"The tables were written on both their sides; on the one side and on the other were they written."

When, in the *Merry Wives of Windsor*, Pistol uses the expression, "He hears with ears," Sir Hugh Evans indignantly exclaims, "The tevil and his tam! What phrase is this, 'He hears with ear'? Why, it is affectations." But, in point of fact, so far from being "affectations," it marks the pictorial redundancy of the earlier stages of language. Such pleonasms arrive from an instinctive desire to make everything even superfluously clear to the dimmest imagination and the least developed intelligence.

Whilst speaking of redundancy, or syntactical repetition, I may notice a construction which classical grammarians call the cognate accusative, and which in English has been called the objective of kindred meaning. An intransitive verb may take as an object a noun having the same meaning or origin as itself; thus—"*to live a life*," "*to die the death*," "*to run a race*," "*to fight the good fight.*"

In these and many similar instances the idea is repeated, in order to strengthen or emphasise the expression. Everywhere I find the same causes, emphasis and a desire for intelligibility.

I think I have now said sufficient to show that repetition is by no means an unimportant element in language, and should not be passed by unheeded.

This, at any rate, I think I have proved. Whether the theory I have advanced, that emphasis and a desire for clear-

* Farrar, *Families of Speech*, p. 126.

ness is the main cause of repetition, is, of course, open to question; still, I may venture to assert that very much may be said in favour of it. When we find inflections repeated, or a new one added to one which is partially losing its force; when the two halves of a word resemble each other wholly or in part; when, in the names of places, a new generation has added a syllable or word to one which is no longer readily intelligible; whenever words and phrases are heaped up in unnecessary profusion; in short, whenever the same idea is repeated, either in the same form or in varied forms, it seems very clear to me that emphasis and a desire for intelligibility has been the motive power.

But, whether this theory be accepted or challenged, the facts and instances I have brought forward remain unaltered, and must show that in the greater number of languages, and notably in our own, repetition is very prevalent and very important.

I have given many examples, and have had much to say on this subject, yet I cannot but feel how much remains unsaid; and I conclude, not because I have exhausted my subject, but lest what has been so full of interest to myself should in the end become wearisome to others.

GLEANINGS IN THE EARLY HISTORY OF LIVERPOOL AND THE NEIGHBOURHOOD.

By JOSEPH BOULT.

Claims for the respect usually conceded to ancient origin and long descent can be so easily advanced, and are so difficult of disproof, that they are usually received with distrust, and are apt to be hastily rejected. If I claim for Liverpool antiquity greater than that usually assigned, I hope to show that the grounds for the claim are good.

It is generally conceded that the earliest mention of Liverpool, in any document now extant, is in a grant from King John, when Earl of Morton, confirming to Henry, the son of Warine de Lancaster, possession of Ravensmeols, Ainsdale, Up Litherland, Liverpool, and French Lea, with eight-pence in the borough of Preston. The date assigned to this document is about 1190; the original grant to Warine's father was by Henry II.

The next historic record is the so-called Charter of King John, who is usually supposed to have acted towards Liverpool the part which Alexander the Great performed for the city he founded in Egypt, except that he withheld the honour of his name; a fortunate escape for the first seaport in the world from the appellation of Johnstown.

The most recent historian of Liverpool* having declared that "there can be no question that King John was the real founder of the borough and port of Liverpool," I fear it may appear presumptuous to suggest that King John merely adopted the town, having the foresight to discern its eligibility as a base for his schemes of conquest, and for combining

* *Memorials of Liverpool*, by J. A. Picton, F.S.A. I. 9.

the superintendence of military expeditions with the enjoyment of those feats of venery in which he so much delighted.

I suppose there is not any doubt that Liverpool received its first recorded designation of borough from that king; but it seems to me unquestionable that the terms of the document expressly imply the existence of a town at the time it was issued; and the author above quoted partakes of this view, inasmuch as he says, "The burgages mentioned in the charter were tenements or dwellings, which must have been constructed by the king's order before the charter was granted."

Of the erection of the houses at that time he does not adduce any evidence, though Baines mentions a tradition that the people dispossessed by the formation of Toxteth Park were removed to Liverpool.*

The important words in the Charter, as translated, are as follows:—"Know ye that we have granted to all who shall take burgages at Liverpool, that they shall have all liberties and free customs in the town of Liverpool, which any free borough on the sea hath in our land. And we command you that, securely and in our peace, you may come there to receive and inhabit our burgages."

The Charter is to all who may be willing to have burgages in Liverpool, and appears merely to concede burgage tenure, which was the equivalent in towns for the socage tenure of agricultural districts, and referred to the mere land upon which dwellings or other erections might be placed.

Shortly before issuing this ordinance, the king had obtained Liverpool in exchange for English Lea, from that Warine de Lancaster whom he had recently confirmed in its possession; and having obtained it, for the reasons suggested

* *Liverpool*, p. 84.

above, or for others now unknown, he lost no time in improving his property, and making it as productive as possible. Therefore, he constituted Liverpool "a free borough on the sea"; and, important as was this concession, it seems to be the sole privilege or service which he designedly conferred upon it as a town, a "free borough" being one in which fixed and known services or customs were rendered by the holders of burgages.

The date is uncertain at which the local sub-divisions of England were formed, which are now called counties, hundreds, parishes, and towns. It is usual to ascribe the arrangement to King Alfred, who, next to King Arthur, is the favourite hero of all those writers of romance which passes for history, but who is so overladen with wise and beneficent ascriptions that he appears almost as mythical as "good King Arthur" himself. It seems to me more probable that most of these local divisions are of much earlier date; but I must abstain on this occasion from adducing the reasons for that opinion, having already done so to some extent in the past session.

I assume, then, that the township of Liverpool, when it passed to King John, like most, if not all other townships, possessed a bohr of some kind; and, looking to the nature of the site, I assume that the bohr was on the crest of the hill, which is now surmounted by the Town Hall, Exchange, and St. George's Church. This conjecture is confirmed by a reference to other places on the neighbouring margin of the sea, such as Everton, Kirkdale, Bootle, Crosby, and others, the original sites of which are all inland, though the sea forms one of the boundaries of their liberties. It obtains additional confirmation from the usual practice of selecting eminences as sites for settlements, less for sanitary than for strategic considerations; a practice so usual as to have led to a confusion between the words bohr and -burg

(a hill), if, indeed, the latter be not a derivative from the former.

Again, as every township possessed its place of assembly, and those places, as far as my observation goes, were always on an eminence, natural or artificial, I apprehend that in Liverpool it was placed on the southern extremity of the peninsular hill, the site which was subsequently occupied by the Castle and St. George's Church: an historic succession very usual, as all will admit, as respects the temples of peace and war, and, I believe, scarcely less usual with respect to the place of assembly, whether it was called the thing, the law, the tor, the moot-hill, or by any other name now deemed synonymous; though I suspect that some of them originally were distinctive of the various functions the different assemblies performed. It is very probable, as I believe it usual, that the place of assembly was constituted the stronghold or keep of the settlement, the dungeon, or boulevard, when wealth took the form of cattle, and so gave those names to the stronghold as well as to the bohr itself.

If the sketch I have already given of the history of the Mersey* approach correctness, then the waters of the old pool, derived from the uplands on either side, including the moss-lake, meandered to the sea through the wide marsh which lay between Liverpool and Cheshire. As the sea advanced inland, the marsh disappeared, and the base of the site ascribed to Liverpool was washed by the tide; and I hold that it was at this period that the present name originated. The various orthography of that name has occasioned much perplexity, and ingenious attempts to explain its significance, from the eponymous bird called a Liver, through many variations. Whilst I have little doubt that the form of Litherpool is derived from the moss-lake,

* *The Mersey as known to the Romans. Proc. Lit. and Phil. Soc.*, 1872-3.

lither being a derivative from K. *lithe*, viscidity, sluggishness, I have not any doubt that Liverpool is derived from K. *li-feor*, sea-brink, and Lerpole, or Lyrpol, from K. *lear*, the sea, or W. *llyr*, a brink or shore. The form Lidepol, sometimes met with, is apparently K. *li-de-pol*, the pool of the sea.

The arrival of the sea would necessarily produce important changes in the habits of the people. The marsh not improbably afforded pasture, for, in so large an extent, variations of level would almost certainly be found, nay, even eminences of some kind, of which the bluffs on either side are remains.

When the land was replaced by tidal water, cattle would give place to boats and fishing nets. Then, as a consequence, communication with distant places, not alone to the Cheshire shore, but to Wales, Man, Scotland, and Ireland; and communication would lead to trade.

The elder Baines, in his *History of Lancashire* (iii. 524), states that, "In the hundred of Derby, Roger of Poictou stationed four barons: * * * * * * (of whom) William de Molines, or de Moulines, to whom he afterwards gave the manors of Sefton, Thornton, and Kerden, was appointed Castellan of Liverpool, where the earl had erected the fortress, which, in the records of that age, is sometimes called the Castle of Derby."

It is remarkable that the younger Baines appears to have overlooked this passage, though he enters into an elaborate investigation of the history of the Castle, and says, "According to Camden, the Castle of Liverpool was built by Roger of Poictou. There is no evidence in support of this assertion. The probability is, the Castle occupied (but not built) by Roger of Poictou, was that of West Derby, situate about four miles to the east of Liverpool." He adds, "As I have already mentioned, the Castle of West Derby was of very

great antiquity, and a manor house, also very ancient, was built on its ruins. So late as the year 1790, remains of this manor house still existed near Croxteth Hall, in a mound from twenty to thirty feet high, surrounded by traces of a moat."*

He also observes: "There is little doubt, however, that the Waltons of Walton, who were the original stewards of the hundred of West Derby, and the first governors of the Castle of Liverpool, were descended from one of the knights who came over with Roger of Poictou; and there is no doubt that the Molyneuxes, who held those offices from the reign of Henry the Sixth, were of equally ancient origin."†

As neither father nor son quotes any authority for his statements, it is impossible to attach much weight to any of them, and so it is allowable to balance the probabilities.

It seems inconceivable that the great earl, Roger Montgomery, should place the chief defence of his southern frontier at Derby, when the more commanding position of Liverpool was available. It is impossible to discern any strategic advantage in the inland position, whilst, on the summit of the bold promontory, almost surrounded with water, any fortress would be easily defended, and assailed with difficulty. As I have already conjectured, this site was selected by the earliest settlers for their bohr, which was alike their homestead and stronghold.

It seems to me also inconceivable that the lords of the soil were oblivious of the topographical and social changes to which I have alluded. The predecessors of King John and of Warine de Lancaster were doubtless duly apprised of the loss of pasture, wherefor their tenants sought diminution or change of service; and when the new course of life was established, and prosperity returned, the exactions of those lords would also return. The younger

* *Liverpool*, p. 67. † *Ut supra*, p. 64.

Baines mentions that King Stephen presented to the Earl of Chester all his estates between the Ribble and the Mersey, and admits that Liverpool was favourably situated for shipping the forces of the De Lacy family, who took a very active part in the early wars of Ireland, and in the time of King John had large possessions in Lancashire, in the immediate vicinity of the port,* though the port itself had then passed to Warine de Lancaster. The fortifications at West Derby may well have represented some small retreat for those charged with the protection of the king's game, and the maintenance of the obnoxious forest laws, against which there were continual insurrections.

The works constructed by John in Liverpool were probably extensions for the accommodation of forces waiting for a wind, and the strengthening of the outposts, rendered necessary by the increased importance the position had acquired. The younger Baines also admits that there is little doubt the Castle of West Derby mentioned in the Pipe Rolls, or Sheriff's account of 4 John, was the Castle of Liverpool, and a similar mention in 17 John.† On the other hand, he says, "In the year succeeding that in which King John granted the first Charter to Liverpool, he ordered the hundred courts to be removed to Liverpool from West Derby, *where they had been held from before the Norman Conquest.* This appears from the following extract from the Sheriff's account or Pipe Roll of the year 1208:—'And in default of West Derby, which is removed to Liverpool, £8.'"‡

The statement in Italics is pure assumption, for which there does not appear to be any foundation; and the removal of the courts to Liverpool may have been a return to

* *Ut supra*, p. 75.

† *Ut supra*, p. 78. As, in the first entry, the works were under the inspection of Henry de Waleton, he would appear to have been the Surveyor rather than the Governor.

‡ *Ut supra*, p. 84.

the original domicile. Whilst the new works were in progress, it is very probable that the accommodation for the courts had been destroyed, especially if those works were extensive; and possibly the Peel, or moated residence, at Derby, was used temporarily, with additional guard.

It becomes, then, almost a matter of certainty that Liverpool was a place of importance before it passed into the possession of King John; and, if it were, if it were also a shipping place for military expeditions, it is highly probable that there were entrenchments of some kind, within which the forces assembled, and remained until they embarked. Doubtless, if numerous, a considerable part would be lodged in tents, as when William III. embarked at Hoylake; but a military base of more permanent character than Hoylake would have quarters for the General and his staff, and protection for the shipping place. Thus, then, it is justifiable to suppose that, not only was there a fortification on the site of King John's Castle, but also a fortlet on the beach, probably on the site of the later tower. I find it difficult to believe that any man, even so improvident and short-sighted as King John, would deliberately lay the foundation of a town in such a wilderness as we must suppose the site to have been, if the account usually received is correct; and it seems to me more reasonable to suppose that the king was guided by the experience of several generations, and by the policy of the De Lacys, and of other astute and powerful leaders. Nay, it is not improbable that, besides his desire to possess a point of departure so convenient to Wales and Ireland, the king may have dreaded the advantage such a position would give to an Earl of Chester, or other local magnate, whose baleful shadow lowered upon the throne. Besides, on what part of the coast, from Milford Haven, northward, was there any place of embarkation available for an English Sovereign? The navigation of the Dee must

ever have been tedious, and often dangerous, especially from North Wales, and the march of levies from the northern counties would be materially shortened by the substitution of Liverpool for Chester, even if the proximity of the latter to Wales, and its subjection to the earls, were not fatal defects.

Mr. Thomas Baines conjectures that Liverpool was one of the six berewicks which are mentioned in *Domesday* as parcel of the manor of West Derby, but are not named; a berewick being, I apprehend, a granary, or depôt for the bere paid as tribute, tax, or rent, the origin of all the numerous Berwicks throughout the country, the Keltic *fich*, farm, being possibly the root of all the -wicks and -wiches, including the Cheshire-wiches, in which the *salinaria*, or rent for salt, was collected.

The names of Norwich, Northwich, and Northwick are probably variations of one name, to denote a northern district of taxation.

In Archbishop Alfric's *Vocabulary*, ascribed to the tenth century, the word *publicanus* is glossed wic-gerefa; *castra* is glossed fyrd-wic, fyrd being the gloss for *castrum*.

In what is called a semi-Saxon Vocabulary, ascribed to the 12th century, the word *castellum* is glossed wic, *vel* lutel port, all corroborative of the conjecture I have advanced.

It is very improbable that the custodians of the Castle would allow any streets in such close proximity as Brunswick Street or James Street, though at some time there was a tunnel under where the latter was subsequently made, which was no doubt used for those purposes of which it was undesirable the townsfolk should have cognizance. Thus the original fortlet would naturally be placed at the foot of Water Street, or Bancke Street, to give its earlier name, derived, probably, from the Mardyke, or sea bank, which protected the shore; whilst the Chapel of Our Ladye and S. Nicholas was

at the end of the other road leading from the beach, now Chapel Street, and accessible to devout residents unwilling or unable to attend daily prayer in the distant parish church, and a receptacle for those votive offerings which the wanderer on troubled waters had promised to the first altar after land was safely gained. If not deposited in Liverpool, those offerings might be carried to various shrines, as the travellers should wend their way, and so be wholly or partially lost to the Mother Church of Walton.

In those days some protection would be required for the persons charged with collecting the dues on imports and exports, both regal and local, and that protection a fortlet would yield, besides being of service in covering the embarkation or landing of materials of war. When the tunnel under James Street was constructed, its approach from the shore would be protected by the Mersey Island fort, named in accounts of the siege during the Civil Wars, and which I suppose to have stood on Mann Island.

Prior to the accession of the Tudors, the prosperity of Liverpool appears to have depended, in great measure, upon its being the base of the military expeditions against Wales, Scotland, and Ireland; but its prosperity appears to have culminated in the reign of Edward III., declining under his grandson, Richard II., so as to have become traditional under Elizabeth, and justifying the appeal on behalf of her poor decayed town.

Mr. Thomas Baines cites various documents which illustrate the importance of Liverpool as a naval rendezvous and a trading port under Edward III., and to this date, I suppose, is to be referred the institution of the Court of Passage.

When the conquest of Wales was completed, and that of Scotland abandoned, Liverpool would be exposed to the competition of Chester, Milford Haven, and Bristol, on

the south, and of Lancaster and Whitehaven on the north, and to that of all the staple ports elsewhere, and would decline under the blighting influences of peace and monopoly combined. The highest farm of the town, until after the accession of the Tudors, was nearly £600 sterling a year in 1348,* and so continued to the close of the century; but, by the middle of the following century, in the reign of Henry VI., the farm fell to £260 sterling.†

The ancient remains found near Hoylake appear indicative of the use of that locality as a camp of embarkation prior to the reign of William III. Mr. Ecroyd Smith observes, of the coins found there, that the great bulk of the heterogeneous series appertain to the thirteenth century;‡ and he is supported by Mr. Charles Potter, in a communication to the Historic Society, in December, 1875, on the Geology and Archæology of the Cheshire Shore. The nature of the relics, combined with the absence of structural remains, appears reconcilable with the existence of successive temporary encampments, but wholly inconsistent with the history of a town or port.

Therefore, it may be inferred that the safe road of Hoylake was adopted by earlier military leaders for the same advantages which led to its selection by William III. and Marshal Schomberg; Liverpool being on each occasion the principal rendezvous.

There cannot be any doubt that whatever trade there was upon the Mersey was in proximity to the tower and chapel, a curious indication that the old pool was more shallow at the time the settlement was founded than it afterwards became, otherwise its shelter would have been sought. The change illustrates that erosion by tidal water to which I have

* Baines's *Liverpool*, p. 153.

† *Ut supra*, p. 187.

‡ *Ancient Meols*, by the Rev. A. Hume, LL.D., &c., &c., p. 289. It seems probable that the date, 13th century, is a *lapsus penna* for 14th century.

ascribed the conversion of the ancient marsh and its streams into the arm of the sea, now known as the Mersey. I believe the ferry of Liverpool, as distinguished from that of Birkenhead, was across the pool, nearly on the site of South Castle Street to Park Lane; some communication of the kind would be requisite before the ford or bridge was constructed at the foot of Lord Street, otherwise pedestrians must have trudged round the upper part of the pool to the foot of Dale Street, thence crossing the Great Heath; cattle and vehicles tracking the course of the stream off the Mosslake from Dale Street to the bottom of Richmond Row. It is not probable that ordinary tides rose above Dale Street.

It is usually assumed that the word borough is a corruption of burg, which in its turn may or may not be a corruption of borh; but I have attempted to show * that borough is derived from K. *borr-rodh*, great road; and that all boroughs are situated on great lines of communication, which were essentially the king's highway. In such a position, the inhabitants would be subjected to various disadvantages in having to maintain roads with more than ordinary traffic; in having to accommodate travellers of various degrees; in the intrusion of vagrants and otherwise; whilst they would, at the same time, enjoy facilities for traffic with those who came and went in their passage to and fro. Thus the lord and the people would find it for their mutual advantage to commute services into dues, and to agree upon a fixed annual farm. This arrangement appears to have been first adopted in the inland towns, Derby, for example, being one of the oldest boroughs; whilst the cinque ports did not obtain their special privileges until the reign of King John. But the word ports, as applied to them, is corroborative of the suggestion I have made; inasmuch as, originally, ports were the

* *Trans. Hist. Society, Lanc. and Chesh.* 1873-4, *Glimpses of Pre-Roman Civilisation in England.*

entrances into enclosed towns and cities; and ancient ordinances prescribed that all buying and selling in towns should be in the ports. Boroughs on the sea then became ports, because they were entrances into the country, standing at the end of great roads leading into the interior; in modern railway parlance, termini of great lines of communication; and a free borough on the sea resembled a free borough elsewhere, inasmuch as specified dues were exacted. It seems to me rash to suppose that in every case the principle of municipal government was introduced, though doubtless that usually followed. But King John, who created Liverpool a free borough, merely granted burgage tenure to some of the inhabitants; this is all that is specified. I apprehend, however, that the word *free* implies fixed dues, and that the burgages were of a minimum value. Twenty years later, Henry III. conceded a merchant guild, a hanse, and other liberties and free customs to that guild pertaining, restricting the guild to the burgesses and their friends, and also local courts; he threw upon the burgesses the burthen of watch and ward, the maintenance of the roads and all other the like burthens, and they were liable to all dues, ingates, and outgates, both landward and waterward, the court fees, and to compulsory recourse to the town mills. The revenue thus derived was set to farm, sometimes to the burgesses as a whole, more usually to individuals, members of the merchant guild or not, just as it happened. Those who, like the younger Baines, suppose that the burgesses were exempt from the principal manorial and regal rights, both in the boroughs in which they resided, and in all the royal boroughs of the kingdom, appear to overlook the fact that every borough, whether belonging to the king or not, was frequently put to farm; that free boroughs were founded by some of the king's subjects; and that all fiscal concession was necessarily limited to manorial assessments, leaving the

borough and its inhabitants under their original liability for military service by sea and land, for aids, tallages, and all other impositions in the discretion of the proper authority, crown, or parliament, and to the prohibition of imports and exports. To say that "It is impossible to conceive a more perfect freedom with regard to trade and commerce than that given by the crown to the burgesses in the royal boroughs,"* appears to me to display a remarkable confusion of manorial with regal rights. He who held land in socage was still in servitude, only, if it were free socage, he knew the extent of the services he was liable to render. Burgage tenure is the analogue of socage, and did not possess greater exemption. Doubtless, whenever the farm of the borough was in the hands of the corporation, and after the purchase by them of the manor, the burgesses might enjoy that exemption which is still the privilege of the old freemen; just as the lords of manors imposed the whole of the rent or tribute due from their estates upon that portion which they themselves did not occupy; thus making the land retained in their own hands (*i.e.*, their *do-main*) into demesne (K. *de-meas-ne*), that is, inassessable; subsequently the terms domain and demesne became from this circumstance interchangeable. O'Donovan glosses the word *andomain*, which is the negative of domain, as signifying unprofitable land, rocks, moors, and quaws; land which a lord was not likely to convert into his homestead.

The confusion of the words domain and dominion is remarkable; the latter is manifestly derived from the Latin genitive *domini*, but it would be difficult from that to deduce domain, which I refer to K. *do-main*, with which it is identical in spelling and in significance.

The immunity from ingates and outgates which was enjoyed by the people of Prescot and Altcar, I ascribe to the

* Baines' *Liverpool*, p. 91.

indulgence of their lords, the magnates of Knowsley and Croxteth, when the farm was held by them or their clients respectively. The immunity was challenged by the corporation, but conceded for reasons unrecorded.

The roads from the interior which found their termini in the borough, or great road over the sea, were few and straggling, for most of the leading thoroughfares through the suburbs now in use were formed at the close of the last or in the early part of the present century. This was due to the position of the town amidst bogs, marshes, and moors, by which, especially the former, it was isolated. To this, on a former occasion, I have ascribed the pseudonym of Dicky Sam, as applied to the inhabitants of Liverpool, as signifying the dwellers in the fens, K. *dighe-samadh.* The latter word is apparently the root of the verb to sam, now obsolete, but used by Spenser, in reference to the New Jerusalem:—

> "Now are the saints, all in that citty *sam*,
> More dear unto their God than younglings to their dam.
>
> *Faery Queen*, canto x. 57.

Here it is clearly applied to those who are drawn or gathered together to dwell in the New Jerusalem.*

The road to Bankhall and Bootle was by Pillfold Lane, now Vauxhall Road; the northern part of Great Howard Street was not laid out until 1803, Waterloo Road and Regent Road being formed at the same time from the north end of Bath Street.

The great north road led from the chapel and town to Kirkdale, Walton, and places beyond, by Chapel Street, Tithebarn Street, in which was the barn for tithes, Marybone, and Bevington Bush, the latter still rich in the rural

* In the course of the discussion which followed the reading of the paper, it was stated by Dr. Nevins that the word sam is still in use in Yorkshire; and it appears to survive in slang, as when a man treats a party he is said to stand sam.

appellations of Gardener's Row, Summer Seat and Gildart's Gardens, as Bevington, like the Cheshire Bebbington, derived its name from cows. Marybone was sometimes known as Scotland Road; the present Scotland Road is of modern date, and for several years was distinguished by the prefix New.

The road to Everton was through Byrom Street, described by Mr. Picton "as a narrow lane running along the side of the brook," up Richmond Row and Everton Brow, to the fork where Whitfield Lane diverges from Breck Road, but at an earlier period the bed of the brook was probably the road from Dale Street to Richmond Row. The road west of Everton Village, Causeway Lane, was deep and sandy, and, to a recent period, without side walks, so that it is somewhat difficult to understand why it had the name of *Causeway*. The site of Everton Crescent was formerly known as Richmond Meadows, and it is probable that the name of Richmond Row is nearly coeval with the existence of the road by which it is distinguished.

It is not impossible that the Richmond Meadows represent an ancient royal sanctuary, to which those who had incurred the ire of local authorities could fly for refuge; its position, adjacent to the liberties of the borough, and in a royal manor, is consonant with this conjecture; whilst the name of Richmond is very like a modification of K. *rig-maighin*, king's *campus* or *locus*. The *maighin digona* was an inviolable place, a place of refuge; and Dr. O'Donovan suggests that the *maighin* may have been the lawn or enclosed green of a Nemed's residence. Rig-maighin-digona would probably be contracted into rig-maighin, which, with the adventitious -d, often added to words ending in -n, would assume a form and sound not far removed from the present name of Richmond, and closely resembling the surname of Rigmaiden.

Opposite to the meadows were the Causeway-lane Fields

and the Causeway-lane Meadows, to the south of which were the Angel Fields, now covered by the houses and other buildings in Salisbury, Canterbury, and adjacent Streets; the meadows possibly deriving their name from their vicinity to woodland.

At the fork above mentioned, of Breck Road and Whitfield Lane, were the Burrows Meadows; and it is noteworthy that a similar bifurcation on the road northwards from Cockermouth, just after it crosses the Derwent, is called the Boroughs; the coincidence is confirmatory of the suggestion that the word borough is derived from K. *borrrodh*. Following Breck Road and Whitfield Lane to their junction with Belmont Road, formerly Rocky Lane, we find the fields at the corners were known as Butter-holes. In a paper on *Pre-Roman Civilisation in England*, I have attemped to show that similar names, such as Buttermere, Butterhill, and Butterley, are derived from the proximity of ancient highways. On similar grounds, as well as for other reasons, I regard West Derby Road, on the boundary of the townships of Everton and West Derby, as an ancient highway from the Castle of Liverpool to the Hunting Lodge in Derby; a field eastward of the Necropolis was called Butterfield. I am indebted to Syers' *Everton* for the names of these fields. In addition to the names quoted, the arable lands in Everton appear to have been grouped into three fields: (1) The Netherfield, which lay between Netherfield Road (north and south) and the Borough of Liverpool, and between Kirkdale and Everton Brow and the Richmond Meadows; (2) The Houghfield, Hongfield, or Hangfield, bounded by Sleeper's Hill, Beacon Lane, Breckfield Road North, Breck Road, and Oakfield Road; the correct form of the name appears to me to be Houghfield, from its position nearly on the top of the hill; and (3) the Whitefield or Whitfield, which lay between Everton Road and Boundary

Lane, and between Whitfield Lane and the West Derby Road; the Lord's Mill appears to have stood in this locality, four fields bearing the name of Mill Hey, and the name may have been derived from the corn grown on the land. The remainder of the township included the brecks or sheep pasture, and the waste with moor and moss. Traces of a stream appear in the river Hey and the river Slack. I think the line of an ancient cross road will be found in Everton Road, leading southward to Lowhill, doubtless a former Lawhill; for, as I have endeavoured to show in the essay last named, the various lows or laws represent some of the numerous places of assembly, required for bohrs, or manors, hundreds, and counties. It is difficult to specify the court to which the different designations applied, and it is even doubtful if the names were specific; but the Lows in this neighbourhood appear to be numerous, as in Spellow, Walton; Dudlow, Wavertree; Blacklow, Huyton; and the Lowhill at Edgehill, which appears to have been named the Brownlow, in distinction from the Blacklow.* The latter, that is the Blacklow, or Wheathill, (*wit*, for tax), is one of the sources of the Torbeck, a feeder of Ditton Brook, the name of which has been corrupted into Tarbuck, as applied to the township of which it forms one of the boundaries, sometimes spelt Torbock. Spellow may be from K. *speil*, cattle, a medium in which tribute was frequently paid; and Dudlow from K. *did*, a pap or dug, analogues to which are found in the name of Papcastle, Cumberland; the Mam Tor, Derbyshire; and Moel Fama, Denbighshire, all doubtless referring to the milking of the taxpayers. Another Low

* Sandown, Wavertree, may be referable to K. *san-dun*, the ancient fortified house or hill; that it was formerly a place of some importance is apparent from the burial-place, containing six ossuaries, which was discovered in the neighbourhood on the site of Urn Mount, Victoria Park. It was described by Mr. H. Ecroyd Smith, in a communication to the Historic Society, 1868, contained in the *Transactions* for that session.

appears at Greenbank, bearing the name of St. An Low, on Lord Sefton's map of Toxteth, *circa* 1754, which may be a corruption of K. *an lagh, the* law, or great law, and allied to the names of Anfield, which apparently is to be found in every part of the country. It is possible the prefix an- may represent K. *aighne,* an advocate or pleader, whose assistance may have been allowed in the ancient courts, as at a later period in those of Wales; or the prefix may represent K. *ainn,* a great circle, the form an open-air assembly was likely to assume. It appears to me certain that the neighbourhood of Greenbank has been the scene of important events. The escarpment by the brook in Sefton Park, at the north end of the viaduct, is manifestly the work of man, and I am disappointed no relics to confirm this appearance have been discovered during the works which have been carried on there. The names of Broomegge and of the park of Magewom, which appear as part of the boundary of Toxteth, seem to be a record of violence. Broom, as I have attempted to show, as respects the occurrence of the name in Westmoreland, represents Brovacam, the settlement at the junction of roads; such a junction is found in the site assigned to the hamlet of Smithdown, or Smitham, at the corner of Penny Lane and Smithdown Road; the termination -egge I refer to K. *ag,* battle; and I conjecture that Broom was of more importance than the hamlet by which it was succeeded. The name of Magewom is probably A.S. *mægen-wom,* denoting a great crime; and probably a floating traditionary record rendered concrete. The names of Penny Lane and Penketh bear testimony to conflict, K. *pinn-nidh, pinn-keit,* both signifying battle-hill. The names of Penketh and Penny are of frequent occurrence on the ordnance survey. In this neighbourhood, at the junction of Penny Lane and Smithdown Road, are two fields, which, on Lord Sefton's map, *circa* 1754, bear the name of Higher Smetham

Hey, and Smetham Croft, which are derived from the hamlet a certain poor man, Robert de Smethdun, son of Thurstan, was obliged to surrender to King John, in exchange for Thingwall, the site of another local court; and its seems probable those fields are the site of the cottages, or rather hovels, of the hamlet; on Burdett's map they appear to be unenclosed. A curious memorial of Smithdown apparently survives in the modicum of tithe levied in Toxteth. As a royal park the original township would be exempt from ecclesiastical impost, but the hamlet of Smithdown would not enjoy the privilege; and I conjecture that the amount due from Smithdown was paid by the officers of the park, and as the boundaries of the hamlet were destroyed, the original appropriation could not be restored after disafforestation.

Smithdown Road is unquestionably an ancient way, apparently connecting Liverpool with Warrington, through Garston and Hale, and also with the Calder stones, whatever their unknown purpose may have been. In the name of Mosley Hill is a survival of the ancient name *slidh*, or *slighead*, denoting the largest of the ancient highways, so broad that the chariots of a king and a bishop could pass each other. In my opinion, it forms the terminal of the names of many places, such as Knowsley, in *Domesday* Chenulveslei, that is, the road at the head of the great wood; and as Bosley, Bordesley, Broseley, and Mawdesley; Mosley denoting the great chief highway, either a pleonasm or indicative of special importance, from leading to the seat of government. Smithdown Road appears to have entered Liverpool by Brownlow Hill, and formed part of the boundary between Toxteth and West Derby. The name of Sinthedun was sometimes used in place of Smithdown; and abandoning all Teutonic etymology, which in the names of places is usually fallacious, the signification of the words is not very dissimilar.

If treated as Keltic, Smithdown appears to me to refer to the Mosslake, and to represent *eas-midhe-dun*, signifying the water-hill boundary; and Sinthedun, *sin-ta-dun*, round-hill-edge, both having reference to Edgehill, at the base of which the Mosslake and a considerable part of the road lay. Until the close of the last century, Mount Vernon Green, with the site of Edgehill Church, and the houses between the Green and Irvine Street, were all open space, are so represented by Burdett, and, I conjecture, occupy the position of the Law. The line of another ancient road appears to survive in Edge Lane, Broad Green Road, and on by Roby (the road-place) to Warrington. For reasons given in the essay on *Pre-Roman Civilisation*, the name Broad indicates the proximity of a great road; certainly there is no indication of any *broad* green on the line of road; it is not at all improbable that the principal roads would be from one hill of assembly to another, when there was no longer any necessity for that isolation which, I believe, governed their original selection. Each in its degree was a centre of civilisation, and round it gathered the hamlet or the town, the keep and the church. The road last sketched would connect Thingwall with the Brownlow; Smithdown Lane, Anlow, with the Brownlow and the assembly in Liverpool; the line of Everton Road, Anlow, and Brownlow with Spellow, passing the Beacon; and the road connecting Smithdown Road with the Calder stones would also give access to the Dudlow. Sleeper's Hill, Everton, probably represents *slidh-bre*, the road brow, or head.

In a note upon the significance of the name of Toxteth, Mr. Picton has referred to a suggestion offered by me in a communication to the Architectural and Archæological Society, in 1867.* Mr. Picton asserts that A.S. *stoc* is never used for growing timber, and that its primary meaning is a log of

* *The Former and Recent Topography of Toxteth Park.*

wood.* On referring to Bosworth's A.S. *Dictionary*, I find he renders *stoc* by a stock, stem, trunk, block, stick; there is not any mention whatever of a log of wood. In *Promptorium Parvulorum* stokke is glossed *truncus, stipes*, the latter doubtless a misprint for *stirpes;* in the volume of *Vocabularies*, compiled by Mr. Thomas Wright, and published at the expense of Mr. Mayer, are examples in Archbishop Alfric's *Vocabulary*, and others, of *truncus* being rendered stoc. If I turn to Keltic, *stoc* is rendered a stock, pillar, post; also a root, bulb, stem. In the present day, Webster explains stock as the stem or main body of a tree or other plant; the fixed, strong, firm part; the origin and support of the branches; as the stem in which a graft is inserted, and which is its support; as a post, something fixed, solid, and senseless. The flowering plant called a stock, I apprehend, derives its name from the numerous stocks it produces, which, when layered, grow into separate plants. I may remind you that the so-called submarine forest in Cheshire is sometimes called Meols Stocks; a name which has suggested the idea that some of the stocks there have been derived from Stocksteth. Several similar stocks, I understand, have been found in excavations in both Prince's and Sefton Parks. Not that the trees were necessarily cut down by the hand of man, but possibly, as suggested by Mr. Charles Potter, and as sometimes witnessed in the present day in Canada, broken short off by the wind during severe frost. Having regard, however, to the names about Greenbank, I am disposed to think that it is, on the whole, most probable that the Romans penetrated thus far from their outpost near Warrington, marching through the open meadows and marsh land which border the Mersey, making the top of Mosley Hill* their vantage ground, and thence descending with resistless force upon the encampment

* *Memorials of Liverpool*, ii. 527.

below. They may have also penetrated to the secret temple —*ceal-deir*—and reduced it to the few Calder stones which still record its existence. By any other route, their march would have been embarrassed by the great forest of West Derby. In summer the marsh would be dry and firm, and an easy access; and it may be assumed that the Romans must have made their power felt a few miles from their stations. The appearance the stems and butts now present may be due to the weather, to submergence, and the incidents of transit.

Mr. Picton also observes, "Mr. Boult has confounded the suffix *stede*, a clearing, a station, with stæth (modern English staith), a landing-place, which is an entirely different word." So far from being entirely different, I believe the words are orthographical variations from the same root. Bosworth confirms this, for he renders *stæth* as not only a shore or bank, but also as a station, a place; and *stede* as place, or station; while the adjectives *staethig* and *stedig* signify steady and firm. Both forms, I apprehend, are from K. *staid*, state, or condition, and allied to *staidheir*, a step or stair. In the *Vocabularies* before referred to, the word steth is glossed *ripa*. The editor, Mr. Wright, in a note, p. 54, observes, it is the more modern *stade* or *staith*, which is still used in some parts of the country in the signification of a bank of a river, or, in some places, of a wharf or quay. In *Prompt. Parvu*, the word *stathe* is rendered waterys syde, glossed *stacio*, from the *Catholicon*. In a note, Professor Way, the editor, gives different forms of the word in various early copies, and says, at Lynn are quays called "common staiths, "king's staith," etc.; that the name occurs frequently in Norfolk, and he refers it to A.S. staeth, *littus*. A word so diffused as to be found on the Tyne, in Norfolk, and the western counties, is not unlikely to be found in Lancashire.

The origin of the application of the word and its derivatives to landing-places and steadings appears to be due to the special appointment or appropriation of places so-called to those purposes. For example, in the ordinance respecting the Dun-setas,* it is enacted that neither a Welshman shall travel in English land, nor English in Welsh, without the appointed man of the country, who shall receive him at the staeth, and bring him thither again without guile.

Clearly, in this ordinance, the staeth was a frontier station; if the frontier was a deep river, the staeth would be a landing-place, but otherwise it would be a stead, or station. It is quite consistent with the information attainable as to the laws for the government of travellers, that there should be landing-places and other stations at which rivers, streams, marshes, bogs, forests, and hills, should be crossed. If a man came from afar, or a stranger go out of the highway, and then neither shout nor blow a horn, he was to be counted a thief, either to be slain or to be redeemed. Now, it appears to me that in Toxteth was a place appointed for wayfarers who wished to cross the marshland between Cheshire and Lancashire, and it may have become a landing-place, as the encroachment of the sea rendered boats or coracles indispensable. But I must refer those who desire to learn the exact position of the staeth to King John, or to the tidal wave; both have been destructive in the township, and whilst the tide is probably guilty, the responsibility may rest with the king.

The possessions held in Lancashire by the Knights Hospitallers, or Knights of S. John of Jerusalem, appear to have been very limited. Of one there are still traces in Woolton, K. *ul-fith-taun*, the great wood town. It is described as Camera de Wolneton, in comitatu Lancastrie. Sunt ibidem unum messiagium, l. acre terre, v. acre prati, j.

* *Ancient Laws and Institutes*, England.

molendinum aquaticum (perhaps in Torbeck), et viij. li. sunt redditus, et dimittuntur ad firmam, pro xx. marcis, Summa valoris—§ summa patet xx. marce.

The other possession is described as Camera Sancti Salvatoris, vocata Le Stede, in eodem comitatu. Et dimittitur ad firmam, de anno in annum, reddendo inde ad Thesaurium de Clerkenwell, ultra cantarium unius capellani quam inveniet sumptibus suis propriis x. marcas. Summa valoris—§ summa patet x. marce.*

I have somewhere read, but have mislaid the note, that the Knights had fish-stews in Toxteth; and it appears probable that the Camera Sancti Salvatoris was in Toxteth and at Greenbank. I am not aware of any stead or staeth which can offer better claims; nor, considering the purpose to which Toxteth was applied at the date of the Report quoted above, A.D. 1338, and the scarcity of fresh water, is there any other situation so likely for the stews; and to this neighbourhood, in the vicinity of the escarpment before mentioned, I am now disposed to place that waterfall above the wood which I believe gave its name to Oscelesbrook, the southern boundary of Toxteth, in conjunction with Otirpool, more recently known as Otterspool, just as the brook was often termed the Jordan.

Perhaps the jealousy of the Templars was one reason why the monks of Stanlaw preferred Whalley to Toxteth.

The only other staeth near Liverpool is Croxteth, well known as the modern seat of the Molyneuxes of Sefton. Here the station seems to have been on the Alt, and the name appropriately refers to the narrowness of the stream, if K. *croch-staid*, the short station or ferry. O'Donovan gives *bo-chroc*, from Cormac's *Glossary*, as signifying a cow with short horns. If, however, the prefix represents K. *crioch*,

* Camden Society. *The Knights Hospitallers in England*, A.D. 1338. Printed 1857, p. 111.

a boundary, a barrier, we have an illustration of the difficulty arising from deficient historical information, as it is impossible to assign the district or territory of which the Alt was the boundary or limit.

In the essay on Toxteth Park, before referred to, I entered into a careful examination of its boundaries, as described in the *Testa de Neville*, and in the *Coucher Book* of Whalley Abbey. Mr. Picton has gone over the same survey; and, though he does not distinctly refer to my essay, it is difficult to believe that he was not combating the views I expressed. As I understand his conclusions, Mr. Picton supposes that Toxteth formerly extended as far north as Downe Street, near Richmond Row; or, to quote his own words:—"*Primâ facie*, then, there is evidence that the limits of Toxteth in the thirteenth century, along the seaboard, lay within the two *embouchures* of Liverpool and Otterspool." And again, "I cannot see any escape from the conclusion that, at the time of the perambulation and report, in 1228, the portion of Liverpool south of the pool was included in the manors of Toxteth and Smethedon."*

It is wonderful that the ghost of the compiler of the *Moore Rental* has abstained from visiting his wrath upon one who so fully justifies the Molyneux claim that Liverpool heath was all his, and concedes him more to boot. I wish Mr. Picton had proceeded a little further, and explained when, how, and why the Molyneux family, or any one else, had permitted the bounds of Liverpool to be extended to Parliament Street.

The description in the *Coucher Book* may be translated as follows:—"By these bounds, that is to say, where Oskelesbrook falls into the Mersey, following Oskelesbrook in ascending to the park of Magewom, and from the park to Brounegge, following from Brounegge to Brymeclough,

* *Memorials*, ii., 530, 532.

and thence across to the ancient turbaries between the two meres to Lambesthorn, and from Lambesthorn in descending to the Waterfall at the head of Oterpool, following Oterpool in descending into the Mersey."

Mr. Picton notices the peculiarity in this description which arises from the substitution of Oterpool for the Stirpool of *Testa de Neville*, but will not accept my suggestion that the mouth of Oskelesbrook was known then as Oterpool, as subsequently by its present name of Otterspool, and that the clerk had substituted Oterpool for Stirpool, writing O for S. In confirmation of my suggestion, as to Oterpool being the mouth of Oskelesbrook, I refer to Mr. Thomas Baines' statement, that in an Inquisition of the forests of West Derbyshire, 16 and 17 Edw. III., it is recorded that the brook of Otterspool turned a corn-mill, which was called the Mill of Atters,* a name not very dissimilar from the present name of Otters-, or the earlier name of Oter-.

Of Stirpool, Mr. Picton observes:—"Between the outfall of Otterspool on the south, and the old pool of Liverpool on the north, there has never existed any watercourse which would at all answer the description in the text."† The only description I find in the text is that of a stream called Stirpool, with a waterfall at its head, which, I apprehend, may apply to a very small stream over steep and broken ground, such as may have fed Mather's dam and the water-mill there, and then have descended rapidly to the Mersey. Any one who has noticed, after heavy thunderstorms, the channels of the steep streets near the south docks, will be able to realise the appropriateness of the name Stirpool to all those narrow streams.

In the beginning of the present century, Parliament Street was laid down on a give-and-take line between Toxteth

Liverpool, p. 17. † *Memorials*, ii. 530.

and Liverpool, a line which agrees very closely with the boundary as laid down on Burdett's map, and, in my judgment, with the bounds recorded in the *Coucher Book* and *Testa de Neville*, and with Moore's complaints against the aggression of the Molyneuxes and their tenants. The two meres appear to me to have been the old moss-lake on the site of Abercrombie Square and neighbourhood, and a mere in what are called the Parliament Fields, on the line of the continuation of Sandon Street, where a low embankment is now being formed to carry a new road. In the essay on Toxteth Park, I conjectured Lamb's Thorn to have stood near the junction of the Prince's Road with Parliament Street.

In the elder Baines' version of the description from *Testa de Neville*, the expression, "*Up to Lambisthorn*," is used; and from Grove Street there is a slight ascent in Parliament Street, which very probably was greater before the street was laid out and graded.

Mr. Thomas Baines quotes two documents which appear to refer to this matter; the first is a grant from Earl Thomas of Lancaster, in 1309, 3 Edw. II.:—"Know all men, etc., to our burgesses of our town of Lyverpole, six acres of moss (each equal to nearly two statute acres), lying between the Pikecroft lands and the Lambthorn, adjoining the goit of the said town of Lyverpolle, to hold and to have from us and our heirs, freely for ever, pay yearly to us and our heirs a silver penny," etc.*

The second document is a return of the bailiffs of the second earl Henry, made two years afterwards, which explains that the bailiffs of Liverpool answer for one penny of rent for twelve acres of turbary, on the moss, in exchange for a piece of ground enclosed within the park, by charter of Thomas, late earl.†

* *Ut supra*, 127. † *Idem*, 153.

Doubtless, the Lambthorn of Earl Thomas's Charter is the Lamb's Thorn before mentioned, but the site of the Pikecroft lands is at present unknown, so the balance of probability must be tested by each person for himself.

The stone plate referred to by Moore, in the *Rental*, was probably a large square flag laid over the water-course, where crossed by the highway, for the convenience of man and beast, a rude bridge, in fact, not a sluice.

Before concluding, I wish to refer to the little hamlet of Newsham, in the township of Walton, and comprised within the grounds of Newsham House, to which the Yellow House estate was added to form the present Newsham Park.

There is no doubt that the prefix New- in the names of places often indicates that those names were bestowed at a comparatively recent date, especially when the root name is also retained in the neighbourhood with the prefix Old-. But I have long considered such an epithet as in some cases very apocryphal, and have been doubtful if another signification was not intended.

There are, for example, an indefinite number of Newtons, Newbolds, Newbies, Newshams, Newbiggins, Newhalls, Newsteads and Newchurches, besides Newcastles, scattered over Great Britain and Ireland. Taking Newcastle for illustration, the postfix -castle appears to be from K. *caisdeal*, or *caisteal*, glossed a castle, a stronghold, and allied to the Latin *castellum*. But it has been suggested that *caisteal* is itself a derivative from *caiseal*, cashel, a rock or stone, on which tribute was paid, that is, *ail-cise*, equivalent to *ro-cise*. The prefix New- in such connection is probably Keltic also, that is, from *nua*, strong, rather than from the same word in the sense of new.

There can be little doubt that some of the earliest Newcastles were strong positions, at which tribute was collected,

and therefore strong. Some are likely to be successors of earlier fortifications. So Newton-in-the-Willows, or -in-Makerfield, was formerly a position of strength on the ancient road through Warrington and Wigan. The site ascribed to the Castle appears good for the strategy of that day; and it is to be noted that in the neighbourhood are several pieces of land bearing the name of Chesterfield, which has a military sound.

The word *samadh* (samay) appears to have been applied to gatherings or collections of people, as the clergy and monks of any ecclesiastical establishment, the family of a monastery, a congregation, and a family.

Newsham, then, may have been either a place of assembly capable of good defence, or a strong rallying point, round which the able-bodied men of the district gathered together on the first alarm, perhaps placing their households and valuables in the centre. Here, as in numerous other cases, conjecture lacks the aid which the light of history gives to penetrate the palpable obscure.

SALT, AND ITS EXPORT FROM THE PORTS OF THE MERSEY.

By THOMAS WARD.

The manufactured or white salt of Cheshire, as distinguished from the rock salt or natural mineral salt, is made from brine or salt water. This brine is found upon the top of the first of the two beds of rock salt, at a depth of about forty yards from the surface, more or less according to the locality. The fresh water percolating through the overlying beds of sand and marl, reaches the rock salt, and, dissolving it, forms brine, which, when it is fully saturated, contains about 27 per cent. of salt. The Cheshire brines usually contain about 25 per cent. The method of obtaining the brine is by sinking a shaft or well, which is made water-tight, to prevent the fresh water getting in and weakening the brine. A steam engine is employed to pump up the brine, which is usually conveyed through pipes to large cisterns or reservoirs, and thence to the works, to supply the pans in which the salt is made. In some districts the brine upon the "rock head," or the surface of the upper bed of rock salt, having either been exhausted or become too weak to be worth manufacturing, some of the "worked out" mines* in the lower bed of rock salt have been utilised as reservoirs, the brine and fresh water lying in the neighbourhood having been allowed to run in.

In the manufacture of salt from brine, the object is simply to regain the salt that has been taken up by the water. In a fully saturated brine there is what may be called a state of

* For a description of these mines, and also of the beds of rock salt, see my Paper, "The Cheshire Salt District," in the Society's proceedings for 1872-3, pp. 39—63.

equilibrium. Before any salt can be made the brine must become fully saturated, and this state of equilibrium be produced. If we take away a portion of the water the equilibrium is destroyed, and a portion of salt is deposited sufficient to restore the balance. The whole principle of salt making, whether carried on along the sea shores or in our salt works, is one of abstracting the water and causing the salt to form. The moment a particle of water is withdrawn, the salt commences to form crystals, generally at the surface. When a low degree of heat is used, and the surface of the brine is not much warmer than the air, crystals form at the bottom and on the sides of the salt pan, and also on any strings or thorns placed in the brine.

There are various methods of driving off the water. In warm and dry climates most of the salt is made from sea water by the heat of the sun, and is called solar salt. It is generally coarse in the grain. Where the brine contains an excess of water, and where fuel is dear, the water is evaporated by exposing as great a surface as possible to the sun and wind, as, for instance, in letting the brine trickle through large heaps or walls of thorns, or down cords tightly stretched, or over and down a series of steps. In Cheshire we cannot rely upon sufficient solar heat or drying winds to evaporate the water, so are obliged to resort to artificial fuel. In making solar salt, and salt from natural brine springs, the whole of the water is never driven off. There are reasons for this arising out of the manufacture.

The brine is allowed to run into large wrought iron pans, usually varying from 30 to 60 feet in length, and about 24 feet in width, having a depth of from 18 to 24 inches. These pans are set over large fires, having flues running under the pan. There are various schemes for arranging these flues, but the object is the same, that of utilising the heat and consuming as perfectly as possible the fuel. The length of

the pan is decided by the kind of salt to be manufactured. If a fine grained salt is required, the pan is short; say from 30 to 35 feet long. If a coarse grained salt, the length varies very much, though it is usually about 60 feet. The width is mainly determined by the facility of working, and about 24 feet is found wide enough for a man to reach to the middle to rake out the salt. The dimensions have been arrived at entirely by the results of practical work.

The brine is clarified by means of some gelatinous material, as glue, calves' feet broth, and such like. This is added to the brine when the pan is filled, and as the pan gets hot, a scum rises to the top, and is taken off. We will consider now that the brine is in the pan and the fires lighted. How are we to produce the various kinds of salt, from the very fine grained table salt to the coarse bay salt? In a few words the whole thing may be explained. The finer the salt, the greater the heat and the less time in the pan. The coarser the salt, the less the heat and the longer time in the pan.

In making the finer kinds of salt it is requisite that the brine should boil. This necessitates a short pan, for in a long one it would not be possible to keep the whole pan boiling. The waste heat is utilised by carrying the flues under a room, called a stove, at the back of the pan, into which the fine salt, having been taken out of the pan into moulds, is placed to become thoroughly dry.

As soon as the brine has parted with its surplus water, the salt begins to form on the top, and soon sinks to the bottom. The constant ebullition of the boiling brine prevents the salt crystal from forming properly, and breaks it up. Thus boiling pans produce fine, irregular, broken grains of salt. The pan soon becomes sufficiently full of salt to require "drawing," as it is called, and this process takes place twice daily. The salts known by the names of butter salt and stoved salt are made in this way.

When the heat is kept below the boiling point, but approximating to it, a coarser grained salt is made. The grain forms in small flakes at the top, and sinks to the bottom, where, being allowed to remain for about a couple of days, it grows and becomes fairly solid. This kind of salt is the most commonly made, and, being the cheapest in manufacture, is used for many purposes, and is known in the trade as *common salt*. The pan in which it is made is generally about 60 feet long.

The coarser salts, known as fishery and bay salts, require a less degree of heat still, and remain in the pan from five days to a month, and sometimes in pans heated by exhaust steam as much as two or three months. The grain of the salt becomes solid and hard, and increases much in size. Cubes of an inch on the side are occasionally produced.

The samples of the various kinds of salt lying before you will serve to illustrate what I have already said, and it will be useful to keep them in mind during the remainder of the Paper. I have classed them as follows—

Boiled Salts.— Stoved Salts.
Butter Salt (unstoved.)

Coarse Salts— Common, Fishery, Bay, } All unstoved.

The quantity of fuel used in the manufacture of salt by the ordinary process varies from about 10 cwts. to 13 cwts. per ton of salt made, the boiled salts requiring the greater quantity of fuel.

Cheshire salt is sent to all parts of the world, chiefly through the ports of the Mersey. These are Liverpool, including Birkenhead and Garston, Runcorn and Weston Point. The situation of Liverpool and its great advantages are too well known to need any description. Runcorn is upon the Upper Mersey, at the entrance of the famous

Bridgewater Canal. It owes its existence as a port to the Trustees of the Duke of Bridgewater. The docks are now owned by the Bridgewater Navigation Company, Limited. The Bridgewater Canal is connected with the Grand Trunk Canal, which passes through the salt districts into Staffordshire. Large quantities of salt are sent by this route to Runcorn. By means of a short canal, Runcorn is connected with the river Weaver, and thus receives a quantity of salt.

Weston Point is a small port, situated about a mile to the westward of Runcorn. It is at the mouth of the Weston Canal, which connects the navigable portion of the river Weaver with the Mersey. The mouth of the Weaver lies near to Frodsham, but the lower course of the river not being well suited to navigation, the Weston Canal was made early in the present century. Nearly the whole of the salt sent to Liverpool enters the Mersey at this point. It is only within the last five years that accommodation has been provided by the Trustees of the river Weaver at Weston Point for sea-going vessels of the same kind as those frequenting Runcorn.

The ports of Runcorn and Weston Point carry on nearly the whole of the coasting salt trade. Liverpool has nearly the whole of the foreign trade. The diminished depth and difficult navigation of the Upper Mersey confines the trade of the upper ports to vessels carrying from 300 tons downwards, and of a draught of water not exceeding from eleven to thirteen feet. During exceptional tides larger craft may visit these ports, but the trade is practically confined to vessels of the size just named.

The great salt ways to the Mersey ports are the river Weaver, the Grand Trunk and Bridgewater Canals, and the river Mersey. The railways are not used for salt for export purposes, as far as the Mersey is concerned. The river Weaver, by an Act of Parliament obtained in 1721, was made navigable from Winsford Bridge to the Mersey. Continual

improvements have been made from time to time, till now it is one of the best inland navigations in the country. It is managed by trustees chosen from amongst the chief gentlemen of Cheshire, who have no personal interest in the earnings of the river. Owing to the great improvements, steamers and sailing craft, capable of carrying up to 200 tons, are able to navigate the river. The salt is sent from the works to the ports in "flats," carrying from 70 to 200 tons. Of late years, many of these have been propelled by steam, but the majority are hauled down the Weaver by horses, and afterwards they sail down the Mersey. These vessels may be seen proceeding down the Mersey on the ebb tide nearly every day in the year.

The salt sent down the Grand Trunk Canal is conveyed in "narrow boats," sailing in pairs, and carrying about 60 tons the pair. Recently a hydraulic "lift" has been erected at Anderton, near Northwich, where the canal approaches the river. By means of this "lift" a boat and its cargo can be lowered from the canal to the river, or raised from the river to the canal, thus avoiding transhipment.

The exports of salt from the Mersey have increased to a very large extent during the present century. In the year 1800 there were exported from the Mersey 142,475 tons of white salt, and 34,939 tons of rock salt, a total of 177,414 tons. In 1832 we find 345,896 tons of white salt, and 94,400 tons of rock salt sent down the Weaver, being a total of 440,296 tons. Of this a considerable quantity was not for export. In 1844 the quantity of salt exported was 336,922 tons. In the years 1855, 1856, 1857, the exports were respectively 641,896 tons, 787,722 tons, and 644,998 tons. In 1864 the total exports were 738,409 tons. In 1871 the enormous quantity of 942,291 tons white salt, and 109,592 tons rock salt, or a total of 1,051,884 tons, was exported from the Mersey. The year 1875, just closed, shows an export of

932,731 tons of white salt, and 108,185 tons of rock salt, or a total of 1,040,916 tons. During the last five years the total export of all kinds of salt from the Mersey has been 4,844,019 tons.

The salt exports may be divided into white salt and rock salt. The proportions in which these salts are shipped are nearly constant, and had the late historian, Buckle, been alive, it would doubtless have given him great gratification to add this to his other instances of the constancy of averages. Although the items going to make up the total vary from year to year, the relative proportion is nearly the same. If we take the shipments for 1871, 1872, 1873, 1874, 1875, we find them to stand thus—

	White Salt.	Rock Salt.
	Tons.	Tons.
1871	942,291	109,592
1872	799,858	88,784
1873	817,875	99,283
1874	843,555	101,865
1875	932,731	108,185

These statistics give the following proportions—

	White Salt.	Rock Salt.
1871	89·58	10·42
1872	90·00	10·00
1873	89·17	10·83
1874	89·23	10·77
1875	89·60	10·40

When it is known that the shipments of white salt and rock salt are not dependent on each other, nor in the slightest degree connected, but that there seems as much contrariety as is almost possible, the constant proportion is certainly very striking.

Looking at the gross total of salt shipments from the Mersey, we find Liverpool to export about 80 per cent., the

Upper Mersey ports 20 per cent. This proportion, though not nearly so constant as that of white salt and rock salt, does not fluctuate much, as will be seen by the following figures. A dangerous sandbank, nearly destroying the entrance to Runcorn docks, has driven a large amount of trade to Liverpool in 1875.

Percentages of gross shipments during 1871, 72, 73, 74, 75—

	Liverpool.	Upper Mersey Ports.
1871	80·5	19·5
1872	81·3	18·7
1873	83·9	16·1
1874	80·8	19·2
1875	84·3	15·7

The proportion of the white salt shipments from the different ports has not fluctuated so much as that of rock salt, as for instance—

	Liverpool.	Upper Mersey Ports.
White Salt.		
1871	83·8	16·2
1872	83·0	17·0
1873	85·7	14·3
1874	82·2	17·8
1875	85·1	14·9
Rock Salt.		
1871	52·4	47·6
1872	65·0	35·0
1873	69·9	30·1
1874	68·8	31·2
1875	74·3	25·7

We will now look at the distribution of the salt over the great divisions of the globe. Without troubling you with the quantities of salt shipped, the proportions shall be given,

and it will again be seen that there is an element of constancy pervading the salt exports of the Mersey.

In the years	1871,	1872,	1873,	1874,	1875,
Europe took	43·3	44·7	41·8	42·9	38·5
Asia "	26·0	26·4	21·8	27·6	30·0
Africa "	2·4	2·3	2·5	2·8	2·4
America "	27·4	25·5	32·0	25·4	26·5
Australia "	0·9	1·1	1·9	1·3	2·6
	100·0	100·0	100·0	100·0	100·0

Taking the white salt and rock salt shipments separately, we shall obtain a proof of the little connection there is between them.

White Salt.

In the years	1871,	1872,	1873,	1874,	1875,
Europe took	37·3	39·3	35·9	37·0	32·8
Asia "	29·0	29·4	24·4	30·9	33·5
Africa "	2·7	2·5	2·8	3·2	2·7
America "	30·2	27·7	35·1	27·7	28·7
Australia "	0·8	1·1	1·8	1·2	2·3
	100·0	100·0	100·0	100·0	100·0

Rock Salt.

Europe took	95·6	93·45	90·23	91·53	87·60
Asia "	0·0	0·00	0·00	0·00	0·00
Africa "	0·0	0·05	0·31	0·22	0·05
America "	3·3	5·20	6·15	6·51	7·20
Australia "	1·1	1·30	3·31	1·74	5·15
	100·0	100·0	100·0	100·0	100·0

One of the oldest and most important of our foreign salt markets, and one which has been best known in Liverpool

for the longest time, is that of the United States. Prior to the late American war no country took anything like so much salt, or was so particular in the quality of what it took. Now, though still one of our best markets, the East Indies have surpassed it. The salt is sent to most of the chief seaports for carriage into the interior. The principal ports, however, are New York, Philadelphia, Baltimore and Boston, in the Northern States; New Orleans, Galveston, Savannah, in the South, with San Francisco, in the Pacific States. Cargoes are sent to many other ports as the emergencies of trade require. The United States possess brine springs and extensive salt works at Onondaga, in New York State, in Ohio, at Kanawha in West Virginia, in Michigan, and in at least twenty-three States of the Union, and rock salt in the Pacific States and Louisiana; yet English salt is found to be necessary, and competes successfully in nearly all parts of the country. For butter and cheese, and, to a great extent, for packing pork and beef, English salt is preferred. Although a heavy duty is placed upon English salt, it is much used, especially the finer kinds sent in bags, though, on the sea coast, and in districts remote from the American salt works, our ordinary common salt is used. During the last few years, owing to the increased price of English coarse salts, solar salts, made from sea water, in Spain, Portugal, the Mediterranean, and the West Indies, have nearly superseded them. The chief trade to the southern ports is carried on in ships going out for timber and cotton. These vessels frequently take salt as ballast, obtaining merely a nominal rate of freight. Again, to the port of New York especially, the steam vessels have nearly monopolised the whole of the salt, taking it, at times, at as low a rate as 2s. 6d. per ton from Liverpool.

Very small quantities of rock salt are sent to the United States, and these chiefly large lumps for cattle.

The shipments to the United States have been in—

	White Salt.	Rock Salt.
	Tons.	Tons.
1871	185,908	769
1872	150,915	1,488
1873	225,325	1,934
1874	176,930	1,477
1875	213,933	1,750

Next to the United States of America, we have our British North American Colonies. These take considerable quantities of salt, but for several years the exports have been decreasing. The trade to these colonies has located itself in Liverpool, and is carried on almost entirely in vessels going out for timber. With the exception of vessels going to Halifax and Newfoundland, very few ships go out expressly to take salt. Going for timber, they find salt the best and most expeditious lading, and for this reason take it at nominal rates, varying usually from 2s. 6d. to 5s. per ton for Quebec. Our trade with these colonies is chiefly carried on in the spring and summer months. With the exception of Halifax, the other ports may be considered closed from October to April. Montreal and Quebec, up the river St. Lawrence, and all the chief ports in New Brunswick, Nova Scotia and Prince Edward's Island, but especially Halifax and St. John's, N.B., take cargoes, generally of common salt for fish curing. Fine salt is sent up the St. Lawrence. Till within the last few years Newfoundland took very large quantities of coarse salt for fish curing. As in the United States, solar salt has nearly superseded English fishery salt. Our exports to these colonies have been affected by the increased price of English salt of late years, allowing solar salt to successfully compete with it, and also by the discovery of strong brine, and the consequent manufacture of good salt, at Goderich and neighbourhood, in Canada West.

Since the regulation of Lloyd's, requiring colonial built vessels to be partly salted whilst building, a considerable quantity of rock salt has been sent out to the shipbuilding ports.

The shipments to our British North American Colonies, during the last five years, have been—

	White Salt.	Rock Salt.
	Tons.	Tons.
1871	91,823	2,726
1872	63,744	2,602
1873	55,435	4,003
1874	50,401	4,953
1875	48,555½	5,837

The remainder of the American Continent takes but little salt. A few shipments of fine salt in sacks to Cuba, and in hogsheads to some of the other West Indian Islands, and an occasional lot to Central America, amounting in the whole to a few thousand tons annually, leave the port of Liverpool, generally in small quantities in general cargo vessels. Coarse salt being extensively made on a number of the Bahama Islands, especially on Turk's Island, from sea water, nothing but fine salt is sent. Beyond a few tons of rock salt sent to Jamaica, none of this description is exported. The average quantity of the salt shipped is about 4,000 tons.

South America, though a very extensive country, takes a very small quantity of English salt. Occasional lots go to the River Plate, though the great bulk used for curing hides in that district is obtained from Spain and Portugal. Small lots go to Valparaiso and Callao, and also at times to a few of the Brazilian ports. Salt is by no means scarce in South America, so the demand for English salt is not likely to be at any time large. Rock salt, in large lumps for cattle, is sent to Buenos Ayres, but not very extensively. The average quantity of salt annually shipped from Liverpool to the whole of South America, but slightly exceeds 2,000 tons.

The shipments to the West Indies and Central America have been—

	White Salt. Tons.	Rock Salt. Tons.
1871	4,949	90
1872	3,539	48
1873	5,489	41
1874	3,972	22
1875	3,371	38

To South America the shipments have been—

	White Salt.	Rock Salt.
1871	2,279	7
1872	3,485	153
1873	1,116	122
1874	1,944	176
1875	2,480	160

AFRICA.—The average shipments to Africa are about 2½ per cent. of the total shipments. The African market is confined chiefly to the west coast, from the Gambia to the Gaboon. The salt is distributed, in quantities varying from five tons to several hundreds, at one or other of the ports at which the steamers sailing from Liverpool call. This trade was carried on entirely by sailing vessels at one time, some of which took full cargoes of salt, but generally small vessels were loaded with a general cargo consisting partly of salt. The usual custom in this trade, as in several others, was to get as much general cargo as possible, and then fill up with salt, the unfailing resort of all charterers of ships at the end of their lay days, salt being generally obtainable in any quantities at a very short notice. Occasionally a cargo, or part of a cargo, is sent to Cape Town, and, at wide intervals, to Natal. No other parts of Africa take salt. In fact, Africa possesses enormous stores of salt in many parts of the interior,

therefore does not need to import it. The larger portion of the salt sent is stoved salt; occasionally lots of coarse fishery and common have been sent, and a few lots of rock salt. This is entirely a Liverpool trade; a solitary vessel once a year may leave Runcorn. As compared with America or Asia, the African shipments are very small. During the last five years they have been—

White Salt.

1871.	1872.	1873.	1874.	1875.
24,066	20,189	22,096	26,570	25,173 tons.

Rock Salt.

1871.	1872.	1873.	1874.	1875.
0	39¾	308	229	54 tons.

Asia.—No salt market has increased so rapidly as the Asiatic, and this is almost entirely the East Indian, for, as a rule, all the salt shipped to Asia goes to the East Indies. A small quantity has been sent to Yokohama, in Japan, once or twice, but there is no regular trade at present. In China, English salt is prohibited. No rock salt is sent at all.

This trade is a very peculiar one. All the salt for use in the East Indies was procured either from the sea water, as all round the coasts, or from the salt lake Sambur, and the Runn of Cutch, or else in the shape of rock salt from the great salt range of mountains in the Punjab. There was no deficiency in the supply of salt, but that made along the coasts of the Bay of Bengal was of very inferior quality; this inferiority has enabled English salt to compete successfully in the Bengal Presidency, and it is expected that shortly the Madras Presidency will take our salt. There is an enormous duty, amounting to about £5 per ton, on all salt in India. The East Indian trade, unlike most trades, does not depend altogether on the demand for salt. The great object in trying to open the East Indies to our salt, was the obtaining

cheap dead weight cargoes for our large merchant ships going out to bring home East Indian produce. Vessels take salt irrespective of the demand in Calcutta. The result is, that very often the ship obtains a freight so low as to cause a loss on the outward voyage, which is recouped by the homeward freight. Liverpool, of course, has the whole of this trade, and it forms the most valuable portion of the salt trade. Ships frequently take from 1,500 to 2,200 tons at once; thus one cargo very often nearly equals a year's shipments to South America.

The salt sent is all fine salt, though a few cargoes of coarse salt have been exported to Rangoon. Calcutta takes by far the largest quantity of salt. Cargoes are sent also to Chittagong and Rangoon, and a solitary cargo has been exported to Penang. No salt is shipped from England to the Bombay Presidency, as the salt manufactured on the sea coasts and on the Runn of Cutch is very good in quality, and so cheap that our salt cannot compete with it in the market.

Prior to 1845 no English salt was admitted into India. The growth of this branch of the salt trade has been most remarkable. In the ten years, from 1845 to 1855, the quantity sent was 269,747 tons, an annual average of 26,974 tons. From 1855 to 1865, 1,269,523 tons, an annual average of 126,953 tons. From 1865 to 1875, the quantity sent was 2,122,899 tons, an annual average of 212,289 tons. In 1875 no less than 311,828 tons have been sent out. A recent letter from Rangoon reports English salt from that place being conveyed by Chinamen into China.

AUSTRALASIA.—The Australasian trade is almost entirely confined to Australia; a few small lots of salt are sent to Auckland and Otago, in New Zealand. The Australasian salt trade is carried on with the ports of Adelaide, Melbourne, Sydney, and Brisbane. Melbourne is the most important

market, and Sydney the next. A considerable portion of the Australian salt is rock salt, in large lumps for cattle, and most of this goes to Sydney. The white salt is partly fine stoved salt, partly common, both in strong sacks. The Australasian trade is wholly confined to Liverpool, and no ship takes a full cargo of salt. Ships on the berth take salt as a portion of their cargo almost invariably, and, as in many other cases, fill up with salt when other cargo runs short. No salt is sent to West Australia from Liverpool, owing, as I suppose, to there being no regular communication carried on with that country, and also to its possessing salt lakes. Of late a fair quantity has been shipped to Brisbane, in Queensland. The Australian market is a very irregular and uncertain one, and dangerous for shippers, as it soon becomes overstocked. Salt is sent from London in the Australian liners. The shipments from the Mersey have been—

	White Salt.	Rock Salt.
	Tons.	Tons.
1871	7,592	1,233
1872	8,859	1,171
1873	14,465	3,291
1874	10,390	1,766
1875	21,400	5,520

EUROPE.—The European salt market, including the British Islands, is the most important of our markets. A glance at the map before you will show that the whole of our salt trade is confined to Europe, North of France. A few cargoes are sent to Jersey and Guernsey, and now and again a solitary cargo to Boulogne or Dunkirk. In my Paper on the great salt districts of Europe, published in the Society's proceedings for 1873–1874, I inserted a map; the original I have placed before you, and it will show why no salt is required in the South of Europe and France.

RUSSIA takes the most salt of any country in Europe. The season of shipment commences in April and ends in October. In this respect it resembles Canada. The port of Archangel takes a fair quantity of salt, which is shipped in the months of May, June, and July. The Finland ports of Russia very rarely take salt. Wyborg, St. Petersburg, Cronstadt, Narva, Pernau, and Riga are the principal ports to which salt is sent, with now and again cargoes to other smaller ports. The vessels going out rely chiefly upon obtaining homeward freights of timber or flax. Liverpool is very busy in April and May with vessels taking salt, and bound to the Russian Baltic ports. The Cronstadt trade is carried on to a great extent by steamers. As the other Russian salt ports are all shallow water ports, only small vessels of from 200 to 350 tons usually go there. This enables the Upper Mersey ports to compete in the trade, and vessels which arrive in ballast from outports to load salt generally go up to Runcorn or Weston Point, chiefly the latter. The salt being about one shilling per ton cheaper, the vessel generally gets this amount of additional freight, besides having lighter expenses. The salt sent to Russia is almost entirely coarse salt. Up till recently, at several ports, it was a mixture of very coarse fishery salt and very fine butter salt; this was owing to custom restrictions. To the port of Riga there is sent every year from 2,000 to 3,000 tons of the finest and largest lump rock salt. No salt is sent to Southern Russia, as it possesses plenty of its own production. The shipments to Russia during the last five years have been—

White Salt.

1871.	1872.	1873.	1874.	1875.
47,214	59,672	72,350	67,168	49,505 tons.

Rock Salt.

1,917	2,261	2,472	2,953	2,904 tons.

PRUSSIA.—Germany, being well supplied with rock salt and brine springs of her own, has not much need of English salt. The only district taking it is East Prussia, which, lying at a considerable distance from the German salt districts, and having cheap water communication with Poland, takes a considerable quantity of salt annually. The ports to which the salt is sent are Memel, Königsberg, Pillau, Dantzic, and Neufahrwasser. An occasional cargo is sent to Stettin or Swinemunde. German vessels coming over with timber take nearly all the salt as back cargo, with the exception of the Königsberg salt, which is sent in small vessels of any nation willing to go. The freights to the larger ports rule low—8s. and 9s. per ton for Dantzic as an average. These low rates enable a trade to be done. It is very rare that any salt is sent to the ports of Germany on the North Sea. Occasionally cargoes are sent to the Schleswig and Holstein ports, as in the times when they were possessed by Denmark. The salt sent is almost entirely common salt in bulk, which is shipped at Liverpool. The shipments for the last five years have been—

White Salt.

1871.	1872.	1873.	1874.	1875.
40,202	34,930	36,809	27,617	33,730 tons.

NORWAY AND SWEDEN.—This market is but a small one. Sweden takes scarcely any salt. A few cargoes are sent to Gottenburg. Norway takes much more than Sweden. During the early summer months of May and June a number of cargoes of common salt for fishery purposes are sent (to use the trade term) to the "North Cape," meaning the ports of Tromsoe, Hammerfest, Vardoe, and Vadsoe. The vessels taking these cargoes, after discharging, go to Archangel and other White Sea ports, for tar, oats, &c. The other ports of Norway, as Drontheim, Bergen, Christiansand, Christiansund,

Christiania, Tonsberg, take cargoes at no regular periods, but generally when vessels from those ports arrive in Liverpool and wish to go home. The salt is either common or fishery salt. The Norwegians use much coarse salt for fishery purposes, taking a large portion from the South European countries that take their salt fish. The shipments for the last few years have been—

1872.	1873.	1874.	1875.
7,813	8,174	11,576	10,167 tons.

DENMARK AND ICELAND.—Denmark and her European possessions of Iceland and the Faroe Islands take a great portion of their requirements, in the way of salt, from the Mersey. Shipments are being made during the whole year to Denmark, but chiefly during the summer months, when small Danish vessels arrive with corn from home, or cargo from other districts. Nearly all the Danish trade is carried on in Danish vessels from the ports to which the salt is sent. Copenhagen forms an exception to this, and much larger cargoes, especially of rock salt, are sent there. Rock salt is sent to several other smaller ports. The Faroe Islands take coarse salt for fish curing. Every season a number of Iceland, Danish, English, and Spanish vessels take salt to Iceland. This is generally either common salt or coarse salt, intended for fish curing. The Iceland vessels come to Liverpool with wool, ponies, and fish, and return with salt, principally to Reikjavik and Isafjord. The rock salt sent to Denmark is used for melting down into brine, and then refining and manufacturing into white salt. The shipments for the last four years have been—

White Salt.

1872.	1873.	1874.	1875.
7,225	9,143	9,408	8,132 tons.

Rock Salt.

4,389	2,520	2,599	4,332 tons.

BELGIUM AND HOLLAND.—For a long series of years Belgium and Holland imported salt under the same laws, doubtless such as had existed when they formed one kingdom. Under these laws white salt was practically prohibited; thus, until within the last five years, all our salt exports from the Mersey to these countries were rock salt. On the first of January, 1871, Belgium repealed her salt duties, and allowed this article to come in free; since which period white salt has been sent as well as rock salt, but only in small quantities. Rock salt is exported more largely to Holland and Belgium than to any other portions of the world. Fully three-fourths of all the rock salt exported from the Mersey goes to Holland and Belgium. Belgium takes rather more than Holland. Both countries use the salt for refining purposes. Up to the last ten years most of this trade was carried on by Dutch and Belgian vessels, and most of the galliots visiting the Mersey carried salt home. English vessels, after a time, monopolised the trade, and now it is almost entirely in English ships. The regular Belgian and Dutch traders are seen in our ports no longer. At first, sailing vessels carried on the trade, then the Rotterdam steamers monopolised the chief Dutch trade, leaving sailing vessels to take cargoes to the ports not visited by steamers. The Antwerp steamers have, within the last few years, nearly monopolised the Belgian trade. These steamers find rock salt convenient as dead weight cargo, and so take it at a low rate of freight. Within the last few years, the trade which chiefly centred in the Upper Mersey ports has migrated to Liverpool, from whence the steamers sail.

The shipments during the last five years have been—

White Salt (entirely to Belgium.)

1871.	1872.	1873.	1874.	1875.
23,825	5,221	3,527	4,651	4,879 tons.

Rock Salt.

1871.	1872.	1873.	1874.	1875.
78,740	57,925	64,425	67,521	66,604 tons.

The extensive shipments of 1871 were the result of the Franco-German war, Belgium supplying both parties with salt provisions, and being unable to get any salt from Eastern France.

FRANCE AND REMAINDER OF EUROPE.—If we except the Channel Islands, practically no English salt is sent to the remainder of Europe. A cargo, or part of a cargo, once a year, is all that is shipped from the Mersey. France, Spain, Portugal, and the countries bordering on the Mediterranean supply all their needs from the sea, though in France, Spain, and Italy there are salt manufactories where brine from springs is used. Rock salt also is found pretty freely. In the exports of salt from the Mersey, the customs authorities consider Jersey and Guernsey as foreign islands, so I have put their salt under this head. The shipments for the last five years have been—

1871.	1872.	1873.	1874.	1875.
1,451	1,179	2,170	3,226	1,274 tons.

Occasionally a small quantity of rock salt is sent, but scarcely worth mentioning.

The BRITISH ISLANDS take a very large quantity of salt of all descriptions from the ports of the Mersey. As far as England is concerned, the railways take so much salt, that if we were simply to compare the exports from the Mersey, we should gain a very erroneous idea of the relative quantities taken by England, Ireland, and Scotland. The great centres for the use of Cheshire salt are Newcastle-on-Tyne and neighbourhood; South Lancashire, in the neighbourhoods of St. Helens and Widnes, and the banks of the estuary of the

Dee. These are the great chemical manufacturing districts. With the exception of Newcastle-on-Tyne, which takes a portion of its requirements from the Mersey, the railways and canals carry all the salt used in the chemical districts. In Scotland, the great centre of the chemical trade is Glasgow and neighbourhood, and nearly all the salt is sent from the Mersey, chiefly by the Glasgow traders, as the vessels constantly running between Glasgow and Liverpool are called. Ireland possesses no very extensive chemical works. Dublin is the chief importer of salt for this purpose from the Mersey. Besides the chemical manufactories of the parts of the United Kingdom just mentioned, which take so large a portion of the salt exports coastwise of the Mersey ports, we have the fisheries. During the fishing season, and a short time prior to its commencement, there is a large demand for small vessels to take fishery salt to the fishing ports. The ports of the east coast of Scotland, the most important of which are Wick, Peterhead, and Fraserburg, need an enormous quantity of salt. The following statistics will show this clearly. In the year 1875 fishery salt was sent to the east coast of Scotland during the months from April to September, but chiefly in June and July—

April	... 2,150	tons	in	18	vessels
May	... 7,933	,,	,,	55	,,
June	... 17,371	,,	,,	128	,,
July	... 15,094	,,	,,	118	,,
August	5,030	,,	,,	36	,,
	47,578	,,	,,	355	,,

The ports of Whitby and Scarborough take a small quantity of fishery salt during the summer months, but Yarmouth and Lowestoft take the great bulk of the fishery salt sent to the English ports. As in the case of the salt sent to the east coast of Scotland, so in that sent to Yarmouth

and Lowestoft, the great bulk is shipped at Runcorn and Weston Point. Out of 10,246 tons sent to these ports in 1874, 9,576 tons were shipped at the Upper Mersey ports in fifty-nine vessels.

Cargoes of salt are sent during the year at intervals to numerous small ports around the coasts of England, Ireland, and Scotland, particularly to Cornwall in the pilchard season, and to the Irish ports in the fishing season, but there are no large salt consuming districts requiring salt from the Mersey except those mentioned.

The quantities of salt shipped coastwise from the Mersey ports have been—

	1871.	1872.	1873.	1874.	1875
England	71,733	67,370	52,485	66,474	81,450
Ireland	58,728	58,640	48,907	43,675	41,637
Scotland	91,122	71,951	60,164	78,921	75,215
	221,583	197,961	161,556	189,070	198,302

By far the largest portion of the salt exported from the Mersey is shipped in bulk. This applies to the whole of the East Indian trade, all the coastwise, fishing and chemical trades, all of the Baltic trade, with very slight exceptions, and a considerable portion of the American trade. The Australian salt, except the rock salt, and even that, at times, is sent in strong corn sacks. The voyage being long and freight high, salt must not be wasted. A portion of the African salt is sent in bulk, a part in sacks, and a portion in casks going out for palm oil. The South American and West Indian salt goes in sacks and sugar hogsheads. The whole of the fine salts going to the United States are sent in sacks of a very fine quality, whilst a considerable quantity of the coarser kind sent to the Southern States, also to British North America, goes in a cheap Dundee sack. The usual size of the sack is one that holds two cwt. of salt. The

enormous number of sacks used, and the consequent large trade in them, will be seen from the following figures of the sacks filled with salt, shipped from Liverpool in 1875, the sack trade being entirely centred in Liverpool—

January	203,880
February	145,700
March	115,885
April	208,135
May	172,500
June	147,910
July	163,770
August	154,690
September...	179,500
October	214,580
November	216,115
December	210,295
	2,132,960 sacks,

containing over 200,000 tons of salt.

The Cheshire salt trade owes much of its great extent and prosperity to its nearness to the ports of the Mersey; and Liverpool, Runcorn, and Weston Point are deeply indebted to the salt trade for much of their success. It must be borne in mind that the element of cost of carriage enters very largely into the salt trade. Were it not that very low freights are constantly to be had for many countries from the Mersey, salt could not be sent to these countries. When ships accept cargoes to ports, one of the first points to be considered is the chance of obtaining back cargo. Liverpool can always rely upon salt as a cargo quickly loaded; consequently, vessels visiting Liverpool can rely (other cargoes failing) upon getting salt. Take the East Indian trade. There is not sufficient cargo to supply one-fourth of the vessels going to

Calcutta, if we except salt. But salt being required in India, and easily obtainable in Liverpool, the East Indian trade centres largely in Liverpool. Ships leave London and other ports, after discharging cargo, and come to Liverpool for salt. The despatch given is very great. Look, again, at the Upper Mersey ports. Nearly all the clay, flints, and china stone used in the Potteries are sent to Runcorn and Weston Point; thence they go up the canals into Staffordshire. Vessels bring the clay cheaply, knowing they will obtain salt or coals back again. The favourite run of the Cornish clay vessels illustrates well the principle I am pointing out. Clay from Cornwall to the Upper Mersey ports; salt thence to the Tyne; coal from the Tyne to Cornwall. The salt connects the coal and clay. It would be easy to take a number of countries and show the effect upon the salt trade of the proximity of the Mersey ports, and the certainty of always obtaining vessels for these countries. Many countries, as the United States, Canada, Russia, Prussia, &c., possess salt of their own, but the cheap water carriage from Liverpool enables Cheshire to place salt at many of the ports of these countries at cheaper rates than the domestic salt can be sent there by rail, river, or road. A few illustrations will suffice.

Freights to New York have been from 2s. per ton upwards, but for a long time 3s. and 3s. 6d. have been current. Thus it costs as much from Northwich to Liverpool as from Liverpool to New York. No part of the British Islands, unless in the immediate proximity of the salt works, obtains salt so cheaply as New York. From Liverpool to Quebec the rate is from 2s. 6d. to 5s.; from Liverpool to Glasgow, 4s. to 5s.; Liverpool to Dublin, 5s. and upwards; to the Tyne 7s. and upwards, occasionally a trifle less; to other east coast ports, 8s. to 11s. The ports of Riga and Pernau get salt as cheaply as

the Scotch fishing ports, and Dantzic cheaper than Belgium or Holland. The Calcutta freights have varied from 12s. 6d. to 47s., but generally rule low.

How important an element in the trade of the Mersey salt is may be judged from the quantity shipped. After coal and iron, salt is the most bulky of our exports, though not the most valuable. The salt trade at Liverpool is a very old one, and has grown with the growth of the port. It cannot pretend to compete with the coal and iron trades; but when it finds employment for a million tons of shipping annually, it is a trade that Liverpool people ought to know something about, but about which very little indeed is ever written. My object in writing this Paper has been to endeavour to put the trade in its proper position amongst the great trades carried on from the Mersey ports.

SUMMARY
OF
SALT EXPORTS FROM THE MERSEY PORTS
DURING 1871, 1872, 1873, 1874, 1875.

WHITE SALT.

	1871.	1872.	1873.	1874.	1875.
	Tons.	Tons.	Tons.	Tons.	Tons.
United States of America	185,908¼	150,915¼	225,325¼	176,930	213,933
British North America ..	91,823½	63,744¼	55,455¼	50,603¼	48,555¼
West Indies and Central America	4,949¾	3,539¾	5,489½	3,972¼	3,371
South America	2,279¾	3,485	1,116	1,944¾	2,480
Africa	25,170½	20,189¾	22,686¾	26,600¼	25,173
East Indies	273,191½	234,942	199,607½	260,395½	311,828½
Australasia	7,592	8,859	14,465½	10,390¼	21,400
Germany	40,202	34,930½	36,809	27,617	33,730
Russia	47,214¾	59,672½	72,350½	67,168¼	49,505
Denmark and Scandinavia	17,099	15,038½	17,317½	20,985	18,299½
Belgium and Holland ...	23,825¼	5,401¼	3,527	4,651¼	4,879
France	1,451¼	1,179½	2,170¼	3,226	1,274
England	71,733	67,370	52,485	66,474	81,450
Ireland	58,728½	58,640	48,907	43,675	41,637
Scotland	91,122	71,951	60,164	78,921	75,215
Total White Salt ..	942,291¼	799,858½	817,875¾	843,555	932,731

ROCK SALT.

	1871.	1872.	1873.	1874.	1875.
	Tons.	Tons.	Tons.	Tons.	Tons.
America	3,593½	4,621¼	6,102	6,629¾	7,785
Africa	..	11¾	308	229	54
Asia	..	..	..	..	..
Australasia	1,233	1,171	3,291¾	1,766¼	5,520¼
Europe	104,766¼	82,980¼	89,582	93,241	94,825½
Total Rock Salt	109,592¾	88,784¾	99,283¾	101,865¾	108,185
Gross Total Rock and White Salt	1,051,884	888,643¼	917,159¼	945,420¾	1,040,916

Total for Five Years .. .. 4,844,023¼ Tons.

ON INDIAN SNAKES.

By EDWARD NICHOLSON, F.C.S.,

ARMY MEDICAL DEPARTMENT.

Having been honoured by an invitation to speak before this Society on the subject of Indian snakes, I have thought that I could best utilise the time in which a short lecture can be given, by taking successively the various points on which I have observed erroneous ideas to be generally entertained, and, while correcting the popular errors, to establish a few of the most important facts relating to the natural history of this order of reptiles. I shall endeavour in each case to sift out the grains of truth from the proverbial pound of error.

Error I.—*All snakes are more or less venomous, and it is always well to kill a snake, as it may be a venomous one.*

Out of two hundred and sixty species of land snakes found in the large part of Asia known as the East Indies, there are forty which are more or less venomous, but not more than five which are dangerous to human life. Even these five may be further reduced, for one of them (the hamadryad, *Ophiophagus elaps*) is very rare, and another replaces a congener, the two being rarely found together; so that, practically, there are but three snakes the bite of which is dangerous to human life—

The Cobra	*Naga tripudians.*
The Bungarus	*Bungarus arcuatus.* *B. fasciatus* (Malayan).
The Daboia, or chain-viper .	*Daboia elegans.*

The first of these, the cobra, is a very common snake throughout the East Indies, and it causes fully nineteen out of twenty accidents to man. This snake can be recognised at once, by its habit of raising its head and neck from the ground when menaced, and of standing at bay with the skin of its neck expanded into a broad oval disk, ornamented on the back by a black ocellus, or by a pair of ocelli united like eye-glasses.

The bungarus of India (sometimes known as the *krait*) is generally found of much smaller dimensions than its full length of four feet. It is pure white beneath, jet black above, with narrow white arches, generally in pairs, extending across the back. Though very venomous, it is of gentle disposition, and does but little mischief compared to the cobra.

The species of bungarus belonging to the Malayan fauna is very rare in India; it grows to a much larger size than the species just described, and it is known at once by the bands of alternate black and yellow which encircle it.

The viper, *Daboia elegans*, or *D. Russellii*, known as the chain-viper, the *cobra manilha*, and in Ceylon as the *tic polonga*, is a sluggish snake, rarely found away from the sea-coast. It is finely marked with three chains of black links extending down the back, and has the triangular head characteristic of the viperine and crotaline snakes. Though much less akin than the green tree-viper to the American *Crotalidæ*, it may yet be said to be the Indian representative of the rattlesnake. Its poison apparatus is very highly developed.

In by far the greater part of India, the Daboia viper is all but absent, leaving, then, only two venomous snakes dangerous to man.

The other venomous snakes, which are more or less common, yet not dangerous to man, are:—

The tree-vipers, represented by the most common species, *Trimesurus viridis*.

The echis viper, *Echis carinata*.

The various species of *Callophis*.

All these are of local occurrence, and decidedly rare. It is remarkable that the tree-vipers, which are very closely related to the American *Crotalidæ* (though quite destitute of any rattling candal appendage), have poison of very little power on even small animals.

With regard to the harmless snakes, their distribution is so variable that it is by no means easy to select the list of common species. The commonest are—

Ptyas mucosus	the dhāman.
Tropidonotus quincunciatus .	the checkered snake.
T. stolatus	the chameleon snake.
T. plumbicolor	the green grass snake.
Lycodon aulicus	the brown snake, or carpet snake.
Passerita mycterizans . . .	the green tree-snake.
Dipsas gokool	the brown tree-snake.

These are all perfectly harmless. The first of them, *Ptyas mucosus*, grows to a large size, nine feet in length, and lives principally on rats. This snake and the cobra are of great use in keeping down the plague of rats in India.

ERROR II.— *Snakes are slimy, disgusting reptiles, which it is right to kill.*

The refutation of this error, though apparently easy, is in reality most difficult, for it attacks one of the most deep-seated prejudices of civilised man. The error is a survival (though reversed) of the fetish period of human intellect; an iconoclastic revolt against the gods of primitive man, enabling us to indulge freely in the passion of destructiveness. The Anglo-Indian is unconscious of this subjective motive; the objective motive is disgust, and its effects exemplify admirably the remarks made on this emotion by

Mr. Bain, in his work on the *Emotions and the Will.* "The enunciation of disgust is a favourite exercise. * * * The objects thus sought out need not offend the senses in any way; if they can only furnish a slight pretext for being nasty or unclean, it is enough for letting off the charged battery of the powerful organ of disgust. If any class of living beings should happen to provoke this outburst, terrible is their fate. No limits are set to the promptings for evil of this sentiment."

In the present case, the excuse that snakes are slimy is contrary to fact; that they are nasty and disgusting is a prejudice conceived before the persons enouncing it ever saw a snake. Observation cannot rectify the error, for, as the late Sir Arthur Helps says (*Friends in Council*), "a good sound prejudice is not to be contradicted by mere eyesight and observation."

ERROR III.—*Snakes leave a trail behind them.*

The trail of the serpent has long formed a simile for the novelist. It is generally supposed that snakes leave a slimy trail, like that of a slug. But a snake is covered with a coat of scales as dry, clean, and polished as silver; whence the error? It doubtless arises, firstly, from the snake being considered as a sort of land-eel (*anguille de bois*, as the omnivorous French peasant calls it), and secondly, from the fact that snakes cast their epidermis at intervals of a few weeks, at least during their period of growth. The snake manages to stick the thin scarf-skin, loosened from his nose and chin, on to some convenient object, and then peels himself out, leaving the delicate film of skin inside out. This has the misfortune to be called a slough, and it may be called a trail (as it is left behind), but it is anything but slimy, except if left exposed to rain or to dew, when it would tend to dissolve and assume a glutinous consistence. Also,

if a snake were killed just before the casting, or when sick, the skin might possibly come off in shreds, and the new skin beneath might feel sticky at first, giving rise to the general idea of sliminess attached to snakes.

ERROR IV. *Snakes have a forked sting, which they dart out at their enemies.*

The so-called sting is the long bifid tongue common to the snakes and most of the lizards. It is usually retracted in a sheath below the windpipe, and is capable of rapid and vibrating protrusion through a chink in the rostral shield, without the mouth being opened. It appears to be the principal organ of touch, and is perhaps useful in early life for catching insects before the regular prey of the snake can be attacked.

This tongue is very highly developed in the large water-lizards (*varanus*); these are often called *bis-cobras* by low blacks desirous of humbugging their masters; and the fable of the venomous bis-cobra is dear to the Anglo-Indian.

ERROR V.—*Venomous snakes have long curved fangs, which usually lie supine, and are erected when required for use.*

This is true only of the viperine snakes. The poison fangs of the venomous colubrine snakes (such as the cobra and the bungarus) are never less than semi-erect, often permanently erect. In the largest specimens of the cobra they scarcely exceed one-fourth of an inch in length, while in the bungarus, in the venomous snakes of Australia, in the sea-snakes, they are much shorter, and sometimes even scarcely perceptible. Yet such is the force of prejudice, that, in a popular work on natural history, the writer (who is a surgeon, and claims to be a zoologist), standing before preparations of the cobra in the Museum of the College of Surgeons, tells

his readers that the cobra has on each side of its mouth two teeth, fixed at the extremity of the upper jaw; that the largest of the two teeth is nearly an inch in length; and that the teeth lie, in a quiescent state, quite parallel to the jaw. What the writer really saw will be explained under the head of the next error.

ERROR VI.—*Each poison fang has a reserve fang behind, ready to replace it in case of accident.*

This is incorrect. All snakes, venomous or harmless, shed *all* their teeth at intervals; the poison fangs, when present, follow the rule, there being no exceptional law for them, merely a modification of the general law. In the maxilla of venomous snakes there are, in front, two alveoli, side by side; one (generally the outer one) usually occupied by the mature fang in use, the inner one by the "first in waiting" of the numerous future fangs. These vary in development, from the merest embryo of a tooth to the fully developed fang still loosely attached to the alveolus. When the old fang is shed, naturally or by violence, the new fang, having plenty of room, becomes firmly attached to the jaw, and works towards the principal alveolus, being gradually pushed aside by the next fang in growth. If a fang were broken off or torn out, it would not be replaced much before the proper time. All these fangs are covered by a loose fold of gum, or mucous membrane. But what I have said of the poison fangs is applicable, on a smaller scale, to all the other teeth.

ERROR VII.—*The poison is contained in a bag at the base of the fang, and is sent through the fang when this presses on the bag in the act of biting.*

This is quite erroneous. The poison is the salivary secretion of the parotid gland, which lies on the cheek behind the eye. The poison, when ejected by voluntary effort,

passes direct by a duct to the inside of the fold of gum (or mucous membrane) enveloping the fang. The terminal orifice of the duct is exactly in front of the basal orifice of the hollow fang. When an animal is bitten, the pressure puckers up this fold round the fang, and prevents the escape of the jet of poison otherwise than through the fang. Were the fold of gum not to act, the poison would escape along the outside of the fang.

ERROR VIII.—*A venomous snake may be recognised by the peculiar formation of its head, or by other general signs.*

This is incorrect. The converse is to some extent true, inasmuch as the viperine snakes have a peculiar triangular head (like a sextant box). But the venomous colubrine snakes have no such peculiarity, their heads being of the same oval shape as those of harmless colubrine snakes. It is true that they differ from the latter by the absence of the loreal shield, but this is absent in some harmless snakes. All such general rules are devoid of value, and lead into error. It is better to learn the appearance of the three or four venomous snakes likely to be met with.

ERROR IX.—*The male cobra is different in appearance from the female.*

The so-called "male cobra" is *Ptyas mucosus*, the dhaman. The only points of resemblance between this snake and the cobra is, that both grow to a large size, that they are often of the same brown colour, and that both of them live principally on rats. The error is a silly one, but very general.

ERROR X.—*The cobra grows to upwards of six feet in length.*

The cobra supersedes the tiger in modern Indian travellers' tales. Nearly every Anglo-Indian will say that he has

seen cobras above six feet in length. I do not deny that a cobra might possibly be found six feet long, but I know that the odds are at least 1000 to 1 against it. The cobra is about eleven inches long when hatched, and by the rule that the adult length of a snake is six times its length at birth, the adult length of the cobra should be five feet six inches; this is found to be the case, and when the cobra attains this length it begins to increase in bulk rather than in length, and specimens three inches above this are rare.

ERROR XI.—*There are snakes which can crush a buffalo or other such animal in their coils, and then swallow it.*

However devoid of intelligence a snake may be (notwithstanding its proverbial subtilty), it would hardly take the trouble to pursue and seize an animal which it is incapable of swallowing. Snakes nearly invariably swallow their prey alive, and rarely seize any animal more than a quarter of their own weight. A large python could swallow a kid, or one of the smaller kinds of deer; but it is a snake of low intelligence, and when reduced to idiocy by long confinement it appears sometimes to attempt suicide by swallowing its blanket; it is therefore possible that it might attack a buffalo, but it is certain that it could not swallow it, and its powers of compression are very doubtful.

ERROR XII.—*There is a double-headed snake, each end of its body performing the functions of head alternately for six months in the year.*

This fiction, very generally believed among Anglo-Indians, is said of *Eryx Johnii*, a sluggish snake, of low development. Jugglers mutilate the stumpy tail of this snake, and pretend that this is the new head growing. The belief in the possibility of such a thing originates, doubtless, in a sun-myth.

ERROR XIII.—*Snakes exercise a power of fascination over their prey.*

I have never seen any trace of this. Animals placed in a snake's cage as food show the greatest anxiety to escape; when the snake moves to catch them they run about; if the snake remains quiet they soon get accustomed to it. Mice sit on the back of a snake devoid of appetite; birds flutter about in their cage if a snake tries to get in (as I have seen it do).

ERROR XIV.—*Snakes are very sensitive to music; they dance to it, and are attracted by it out of their holes.*

Snakes can have very little appreciation of sound, considering that they have no external auditory apparatus. Sounds are conducted to the hidden ear by the stapes, a long, slender bone, which projects backwards out of the base of the skull. The cobra receives its specific name, *Naga tripudians*, from its supposed habit of tripudiating, or dancing. The French naturalists translate this name as *naje baladine*. It simply stands at bay when irritated by the juggler playing his gourd-pipes close to it. When the juggler pulls out the snake which he is supposed to have attracted from its hole by the charms of his music, I need hardly say that the snake is produced by a clever sleight of hand.

ERROR XV.—*Snake-charmers possess antidotes against snake-poison.*

When the charmer or juggler causes himself to be bitten by a cobra, the snake has nearly always been rendered harmless, either by the extraction of its fangs or by the establishment of a fistula in the course of the poison-duct. The antidote, whether a "snake-stone," placed on the wound, or medicines applied locally or internally, is simply a piece

of humbug. Some bold men will, however, stand a real bite from a genuine snake (I have seen an instance); they have probably become proof against danger by a process of inoculation with small doses of snake-poison. It must be understood that snake-poison acts in proportion to the dose of it injected into the circulation.

ERROR XVI.—*There is some general antidote against snake-poison.*

All experiments in this direction have met with utter failure. If successful, they would be of little or no practical use, and they keep up an unhealthy excitement, detrimental to the interests of science.

ERROR XVII.—*Some animals are either proof against snake-poison, or know of vegetable antidotes against it.*

This is quite erroneous. The only animals proof against the poison of a highly venomous snake are the snake itself, and some other venomous snakes. Snakes of other genera (especially the non-venomous) mostly succumb to its effects.

ERROR XVIII.—*It is possible to exterminate venomous snakes, or that much good will be done by their systematic destruction.*

This is a fallacy which costs many thousands of pounds annually to the Government of India. The experimental destruction which I carried out has convinced me that one-fourth of the whole Indian revenue would have to be devoted for years to this object before any sensible impression would be made on the snake-population of India. The outcry is of a purely sensational character, got up by well-meaning persons, anxious to extend the police functions of government, but without the faintest knowledge of the impracticability of such a crusade, and the little call for it. As

regards white people, venomous snakes only cause one-tenth the number of deaths caused by dogs. Amongst the black population, the annual loss of life, when reduced to sober death-rates, is really of trifling amount; it is on the average about one death in 15,000 inhabitants, spread over sixty square miles of country. A tithe of the money wasted on snake destruction would effect sanitary improvements of far greater value than even the extermination of venomous snakes.

This list of errors could be considerably augmented, though it could never be exhaustive, as fresh errors crop up continually. I would, in conclusion, draw attention to the remarkable illustration which this subject affords, of the law of the three intellectual stages formulated by Comte.

First or Theological Stage.

Fetish period.—The venomous snake is a god; period of simple serpent-worship.

Polytheist period.—It now becomes an emblem of various gods or powers—generation, death, eternity, life.

Monotheist period.—It is a beast cursed by Heaven, and devoted to destruction.

Second or Metaphysical Stage.

Most of the errors now pointed out belong to this stage. In it Lucretius wrote—

> Est utique ut serpens hominis contacta salivis
> Disperit ac sese mandendo conficit ipsa.

Third or Positive Stage.

Snakes are examined in connection with the other classes of reptiles; reasoning and observation take the place of fable and prejudice.

DESCRIPTION OF THE PLATES.

PLATE I.—Naga tripudians, the Cobra.

Fig. 1 & 2.—The gape of the jaws.

„ 3.—Skin of the head removed, showing the parotid (poison) gland and duct, the maxillary and mandibulary saliva-glands, the superficial muscles of the jaws.

„ 4.—Salivary glands and superficial muscles removed; the mucous envelope of the fang also dissected off.

„ 5.—The same, seen from below; showing principally the muscles which keep the maxilla normally depressed by drawing the pterygoid bone back.

„ 6, 7, & 8.—Views of the skull.

PLATE II.—Daboia elegans, the Chain-viper.

Progressive Dissections of the Head.

Fig. 1.—*a*. Skin removed; *b*. poison gland exposed; *c*. poison gland removed; lachrymal gland exposed.

„ 2.—Gland and superficial muscles removed, showing the deep depressor muscles of the maxilla and pterygoid. The short and high maxilla is seen to be attached at its upper part to the prefrontal and postfrontal bones by the elastic jugal ligament.

„ 3.—The same from below (right half).

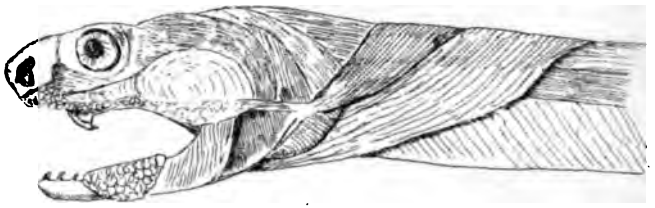
„ 4.—The skull from above.

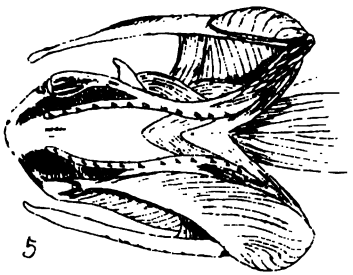
„ 5.—The skull from below; inner alveoli of the maxillæ occupied by the mature fang, outer alveoli empty.

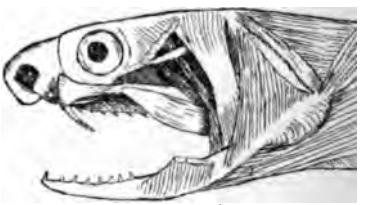
„ 6.—The skull, lateral view; the pterygoid bone is seen to divide, giving off the tooth-bearing palatine on the inside and the slender ectopterygoid on the outside. The latter abuts against the maxilla below its fulcrum, and, when drawn forward, pushes the maxilla, and causes it (and the long fang it bears) to rotate through a considerable arc; the fang is thus erected from its normally supine position.

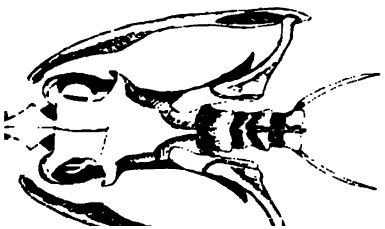
Note.—These etchings are printed from the copper-plates on which I recorded my dissections of Indian snakes. They are not to be considered as having been made for purposes of demonstration, yet, from their correctness, I have thought they might be useful to give a general idea of the anatomy of the head of two principal Indian venomous snakes.

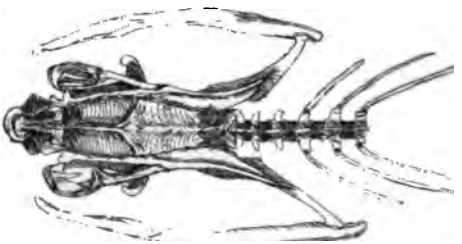
NAGA TRIPUDIANS, THE COBRA.

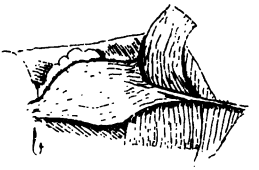












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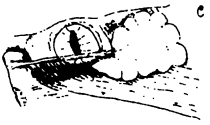

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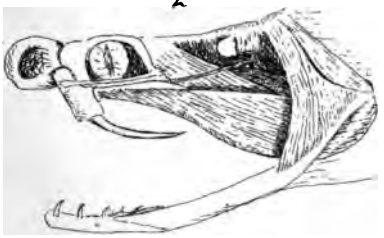

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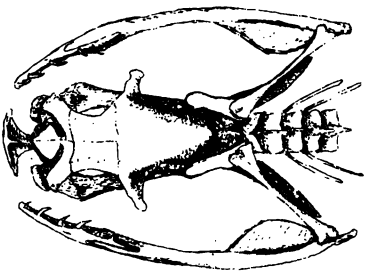

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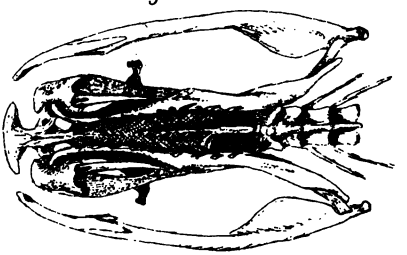


6

DABOIA ELEGANS.

1, 2, 3, PROGRESSIVE DISSECTIONS OF THE HEAD. 4, 5, 6. THE SKULL.

A NOTE ON ITACOLUMYTE, OR FLEXIBLE SANDSTONE.

By ALFRED MORGAN.

In investigating the mineralogy of the precious crystals, the "flowers of the mineral kingdom," my interest in that variety of elastic sandstone to which the somewhat fanciful name of Itacolumyte has been given, was awakened. And I have lately found, in the *Records of the Geological Survey of India*,* a paper by Mr. H. B. Medlicott, A.M., F.G.S., containing fuller information on the nature of this remarkable rock than I had hitherto met with.

It is a prevalent notion that in the Itacolumyte of Brazil we have the true matrix of the diamond. This assertion, which is without proof, has been repeated in many works on gems and precious stones. No authentic instance has yet been produced of its diamondiferous nature, and in India there is not a shadow of such a connexion existing. According to Dana, the Itacolumyte of Brazil, which is associated with gold and topaz, is a micaceous granular quartz rock, which breaks into slabs like gneiss, or mica slate.

In India, the name Itacolumyte has been given to a local and modified condition of a massive quartzite, or metamorphic sandstone. It contains but few and isolated plates of mica, and is devoid of any schistose (foliated) structure. The only known habitat in India of the elastic sandstone is Kaliana, five miles west from Dadri, a small town in the Jheend State, and sixty miles west of Delhi. The hill systems in the neighbourhood are regarded as prolonga-

* Vol. vii., p. 31. 1874.

tions of the Aravali region of disturbance. The highest part of the ridge that overhangs the village of Kaliana, is double crested, the projecting rocks being two strong beds of ironstone, a quartzite strongly impregnated by massive specular iron (black hæmatite), and some strings of pure ore, occurring locally with magnetic iron. Colonel McMahon, who communicates the particulars, says, further, that "the ferruginous quartzite is regularly interstratified with mica and hornblende schists, and that an earthy cellular quartzite also occurs, largely used for millstones. All the series are nearly vertical. The elastic sandstone is only found in patches in this band of millstone quartzite. There is no regular bed or seam of it; the stone-cutters, of whom there is quite a colony at Kaliana, come upon it suddenly when cutting out slabs of the ordinary stone. Often the rock in immediate contact with a nest of the elastic sandstone is highly indurated and quartzose. The stone-cutters declare they sometimes find it in the line of the bedding, and sometimes in the joints. Their idea of the matter is, that it is a mere local peculiarity of the sandstone rock, caused by the percolation of rain water and *miti* (earth) from the surface."

It is probable, as Mr. Medlicott observes, that if the *miti* had been omitted, the natives' explanation is the correct one. Superficially examined, the only difference observable is the greater porosity and friability of the elastic stone, as compared with the ordinary quartzite; and the peculiarity of flexibility is probably due to the mechanical removal by water of some thinly permeating cement, to which the strong rigidity of the quartzite is due. The beautiful specimen of the Delhi stone that I exhibit this evening, was presented to the Liverpool Free Public Museum by Mr. Robert Gladstone. It measures 18 inches in length, 8 inches in width, and $\frac{3}{4}$ of an inch in thickness, and the amount of the deflec-

tion from the plane that it indicates, when supported at each end, is equal to $1\frac{1}{8}$ inches. There is also a fine specimen of the Brazilian variety in the Free Public Museum. With respect to the quality of flexibility—the stone bends very readily up to a certain point, and then comes to an abrupt stop. Mr. F. R. Mallet* found that a slab of the Kaliana stone, measuring 24.5″ × 6.7″ × 1.8″, resting upon supports 24″ apart, gave a deflection of 0.7″, and that, after saturation with water, this amount of deflection was very considerably reduced.

The Brazilian variety has a mottled, greyish appearance, and is of a finer grain than the Kaliana specimen. Its length is $13\frac{1}{2}$″, width $9\frac{1}{2}$″, and thickness $\frac{1}{2}$″. I am indebted to the Committee for kindly lending me the specimens for examination. Professor Haughton thus explains the property of flexibility †—"A most remarkable circumstance sometimes occurs in the formation of these sandstones, which are not composed of pure particles of quartz, but of clay mixed with them, namely, that the particles of quartz mixed in this clay or paste are permitted a certain amount of motion. If you take an ordinary sandstone, it is like any other rock, and with a lens you can see the separate particles, and that each separate particle is touched on every side by a number of other rounded particles that hold it in its place, and it in turn contributes to hold them in their places, so as to form of the whole a rigid rock, like any other. But, occasionally, in some rare cases—which, as far as I have any knowledge of them, are confined to Brazil, South Carolina, and Delhi—you have a rock composed of particles of sandstones, which are not in contact with each other, but lie in a paste of felspathic clay, which clay permits a certain amount of motion between the particles of the mass."

* *Op. Cit.*

† *Manual of Geology.* Haughton. Lecture ii., p. 51.

This explanation is quite consistent with the observed phenomena, and Itacolumyte differs from other flexible rocks in the fact that its power of bending is not due to the flexibility of its constituent minerals, but to the existence of spaces round its quartzitic grains, in which a certain amount of motion is possible.

In flexible limestones, etc., the quality is due to the presence of fibres of asbestos, or plates of mica, which hold the particles of the rock together. The question—What is the true matrix of the diamond? yet remains unanswered; but all that we know of Itacolumyte dispels the idea that they are in anywise associated.

ON THE METHOD OF CORRECTING THE RATE OF A MARINE CHRONOMETER FOR CHANGES OF TEMPERATURE, ACCORDING TO MR. HARTNUP'S LAWS, WITH TABLES AND EXPLANATION FOR FACILITATING THE COMPUTATION OF THE SAME CORRECTIONS.

By ARTHUR EDWARD NEVINS.

In the reign of Queen Anne the British Government offered a prize for some method of obtaining the longitude at sea within a certain degree of correctness, which should stand the test of a voyage to the West Indies and back to this country.

A carpenter, named Harrison, invented a watch to compensate for changes of temperature, and submitted it to be tested. Previous to starting on its first voyage he gave it a rate, subject to corrections for changes of temperature. After it had made the first voyage successfully, he again submitted it for trial, but now gave it a uniform rate, and no correction for changes of temperature. The result was fairly successful, but if the extra corrections for changes of temperature had been allowed on the second trial, its performance would have been almost free from error.

It is to be regretted that he disallowed the necessity for these extra corrections, for at present chronometer makers allow no corrections upon the rate given for changes of temperature; and the universal practice at sea is to allow one rate for the voyage, whatever the temperature may be, apparently under the impression that an acknowledgment that such a correction is necessary would be equivalent to acknowledging that the instrument was a defective one.

The present method of compensating a marine chronometer is not absolutely perfect, but still leaves the rate of

the watch subject to variations owing to changes of temperature; and it is the infinite variety in amount and direction of these changes of rate in different watches which causes the instruments on board a ship to differ from each other in the way they so frequently do.

Every good watch is, however, always affected in the same way, and to the same amount, every time that it is exposed to the same temperature, and the changes in watches follow a fixed law; and knowing, from observation, how they perform in certain temperatures, it is possible to calculate in what way they will perform in any other temperature to which they may be exposed.

This law was discovered by Mr. Hartnup, the Astronomer to the Mersey Docks and Harbour Board, as the result of testing upwards of two thousand watches which passed through his hands at the Liverpool Observatory, having been sent there to be tested and supplied with accurate rates. His investigations on this subject commenced in 1844, very soon after the erection of the old Observatory, and he has, at different times, published the results of his observations. In 1871 he laid the laws he had discovered before the Mersey Docks and Harbour Board, in his annual report, together with the formulæ for making the calculations to ascertain the change of rate in a marine chronometer produced by change of temperature.

Mr. Hartnup's laws are the following:—

1st. Every chronometer goes fastest (*i. e.*, gains most or loses least) in some certain temperature, which has to be calculated for each chronometer from the rates that it makes in three fixed temperatures — the temperatures used at the Bidston Observatory for testing watches being 55°, 70°, and 85° Fahrenheit.

2nd. As the temperature varies, either increasing or decreasing from that in which the watch goes fastest, the

watch goes slower; and its rate varies in the ratio of the square of the distance in degrees of temperature from its maximum gaining temperature.

For example, if a watch goes fastest in temperature 75°, it will go slower as the temperature either rises above or falls below 75°, and it will go slower by the same amount in any two temperatures that are the same distance from 75°, one being above and the other below, as in 65° and 85°, one being 10° below and the other 10° above 75°.

The importance of a knowledge of these facts in using chronometers is easily seen.

Supposing a ship bound to the southward has three chronometers on board, A, B, and C, and they are all sent to the same chronometer maker to be rated, he gives the rate which these chronometers have kept while in his shop, at a mean temperature of, say, 60°. We will further suppose that A goes fastest in 60°, B in 70°, and C in 80°. As the ship gets into warmer weather in approaching the tropics, until she gets into a temperature of 80° or more, A gradually goes slower and slower all the time; B goes faster until the temperature rises to 70°, and then commences to lose, going slower and slower as the temperature increases more and more; and C goes faster all the time until it reaches 80°, which is about as high a steady temperature as will be attained for any length of time out at sea. Now, for these three chronometers to agree in showing the same longitude, it would be necessary for them all to keep steadily to the rates given them in England, or wherever they have been rated; but if they do not keep to these rates, the longitudes indicated by them will differ continually, and, by so doing, cause uncertainty and anxiety to the person using them.

There is another case which may also occur, and which is really more important than the one above mentioned. It may happen, especially if all the chronometers on board are

by the same maker, that they all go fastest in about the same temperature. Now, supposing that all these went fastest in, say, 80°, and as in the above-mentioned instance the rates of all of them were obtained in about 60° by the chronometer maker, they would all go steadily faster than the rates given as the weather got warmer, and would, therefore, all continue to indicate nearly, or exactly, corresponding longitudes, and these longitudes would all be wrong; but in this case the person using them would feel confidence in his position, and perhaps come to harm unexpectedly.

When the mean rates which a chronometer has made in the three temperatures, 55°, 70°, and 85°, are known from the Observatory rate sheets, it is necessary to calculate the quantities, C, T, and R, for that watch.

T is the temperature in which the watch attains its maximum gaining rate.

R is the rate at T.

C is a constant factor, which, multiplied by the square of any number of degrees from T, shows the amount of loss for that number of degrees.

It may be here mentioned that C and T have been found by experiment to remain constant for long periods, seldom changing, unless the watch is either cleaned or repaired. R, on the contrary, is liable to change occasionally, and should be verified at every opportunity of obtaining a rate by observation.

Formula for finding C, T, and R.*

Rate in 55° say — $0^{s}{\cdot}72$ ... r

... $r - r' = -0{\cdot}45$ ... d

,, 70° ,, — $0^{s}{\cdot}27$ ... r′

... $r' - r'' = +1{\cdot}08$ ... d′

,, 85° ,, — $1^{s}{\cdot}35$ ... r″

$d - d' = -1{\cdot}53$

$d + d' = +0{\cdot}63$

* Sign + indicates fast error, or gaining rate.
,, − ,, slow ,, or losing ,,

To find C

$$C = \frac{2\,(d - d')}{30^2} = \frac{-3{\cdot}06}{900} = -0{\cdot}0034$$

To find T

$$-\,(T - 70^\circ) = \frac{d + d'}{C \times 60} = \frac{+\,0{\cdot}63}{-\,0{\cdot}204} = -\,3^\circ{\cdot}1$$

$$T = 70^\circ - 3^\circ{\cdot}1 = 66^\circ{\cdot}9$$

To find R $(T - 70)^2 \times C = 9{\cdot}61 \times 0{\cdot}0034 = 0^s{\cdot}03$

Rate at - 70° = $-\,0^s{\cdot}27$ losing.

Difference to T = $+\,0^s{\cdot}03$ faster.

R - - - - - = $-\,0^s{\cdot}24$ losing.

Let - - N = any number of degrees from T.

Then $C \times N^2$ = amount of loss for N.

The quantities, C, T, and R, for any watch, having been found, the rule for finding the rate of the same watch in any given temperature is as follows:—

Take the difference between the given temperature and T (calling this difference N).

Multiply N^2 by C, and the result will be the amount by which the watch will go slower at the given temperature than it does at T; and, therefore, by applying the amount thus obtained to R (the rate of the watch at T), the rate in the given temperature will be obtained.

When C, T, and R have been found, the rate which the watch will keep in various temperatures can be found from the Tables attached.

Table 1 gives the amount by which a watch will go slower than at T, at any given number of degrees from T. The rule for using the Table is:—

Take the difference between the given temperature and T (that is, N).

Take C to the nearest third decimal place. Enter the

Table with C at the head. Enter the column marked N, with N as given to nearest degree, and in the column marked Cor^{n} will be found the amount by which the watch will go slower for N degrees.

Example :—

T 72° C 0·0032 R − 0·54

Required the rate in 60°.

Difference between T and given temperature = 12° = N.

Enter Table headed C 0·003, and column N, and take 12°.

The column headed Cor$^{n.}$ gives − 0^{s}·43 losing.

R − 0·54 −

Rate in 60° - - − 0^{s}·97 −

Tables have been calculated for C 0·001, 0·002, 0·003, 0·004, and 0·005, and for a range of 100° of temperature.

Table 2 is for the same purpose as Table 1, but is so arranged as to avoid the necessity of finding N.

Each of the five sheets is devoted to one value of C, extending from 0·001 to 0·005, which is the range within which every useful watch must have its C. The numbers along the top and bottom of the page are the temperatures in which T may fall; and the range, taken from 30° to 100°, will include all chronometers fit for the general purposes of navigation.

The numbers at each side of the Table are the temperatures in which it may be necessary to find the rate of the chronometer, and as these numbers extend from 30° F. (below freezing point) to 100° F., they will include all temperatures to which it is likely that the watch will be exposed on a voyage.

The rule for using the Table is—

Enter Table with given C at the head.

Take the T of the watch either from the head or the foot of Table, and take the given temperature in which it is desired

to find the rate of watch from the side column (from the *left* hand side, if T is taken at the *top* of Table, and from the *right* hand, if T is at the *foot* of Table), and where the two lines meet will be found the correction to be applied to R.

Example :—

C 0·003, T 61°, R + 1ˢ·54 to find the rate in 78° temperature.

Take C 0·003 at the *head* of the Table, and T 61° in the top line.

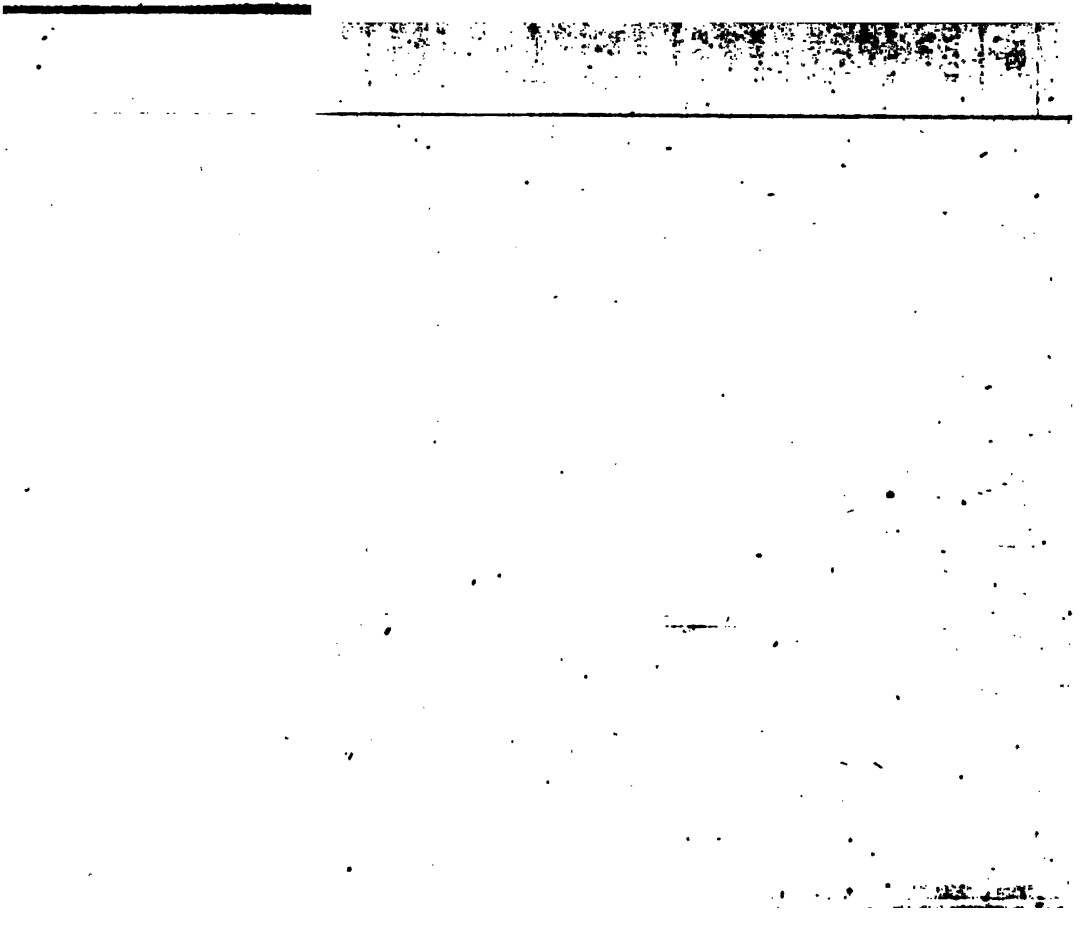
Temperature 78° in the *left* hand column, gives Corⁿ· 0ˢ·87.

R	+ 1ˢ·54 gaining.
Corⁿ·	− 0ˢ·87 slower.
Rate in 78°	+ 0ˢ·67 gaining.

N.	Cor'n.	N.	
	s.		
1	0·00	81	1
2	0·00	82	2
3	0·01	83	2
4	0·02	84	2
5	0·02	85	2
6	0·04	86	2
7	0·05	87	2
8	0·06	88	2
9	0·08	89	2
10	0·10	90	2
11	0·12	91	2
12	0·14	92	2.
13	0·17	93	2.
14	0·20	94	2(
15	0·22	95	2'
16	0·26	96	2'
17	0·29	97	2(
18	0·32	98	2(
19	0·36	99	2(
20	0·40	100	3(

50
0·40
0·36
0·32
0·29
0·26
0·22
0·20
0·17
0·14
0·12
0·10
0·08
0·06
0·05
0·04

Fal	8	4
	3.65	0·
	3.58	0·
	3.51	0·
	3.45	0·
	3.39	0·
	3.34	0·
	3.29	0·
	3.24	0·
	3.20	0·
	3.16	0·
	4.13	0·
	4.10	0·
	4.07	0·
	4.05	0·
	4.03	0·
	4	



Fa	4
97	1
87	0
77	0
68	0
59	0
51	0
43	0
36	0
30	0
24	0
19	0

30	1·4
16	1·3
92	1·1
00	1·0
78	0·9
68	0·7
58	0·6
48	0·5
40	0·4
32	0·4

GES

N.	Cor'n.	N.	
	s.		
1	0·00	81	1
2	0·00	82	2
3	0·01	83	2
4	0·02	84	2
5	0·02	85	2
6	0·04	86	2
7	0·05	87	2
8	0·06	88	2
9	0·08	89	2
10	0·10	90	2
11	0·12	91	2
12	0·14	92	2
13	0·17	93	2
14	0·20	94	2
15	0·22	95	2
16	0·26	96	2
17	0·29	97	2
18	0·32	98	2
19	0·36	99	2
20	0·40	100	3

ON THE MEN WHO HAVE INFLUENCED MODERN GERMAN THOUGHT.

By BARON LOUIS BENAS.

Among the nations that take rank in all that concerns the true civilisation of the present age, the Teutonic race does not occupy the lowest position; and yet, of all the great human families that have contributed to the vast domain of art, science, literature and philosophy, the German people were the last to achieve prominence. Whilst Spain was revelling in the philosophic lore of her high schools in Cordova, Granada, Toledo, and Sarragossa; whilst Byzantium treasured up for itself the relics of the classic ages, and the wise men of Constantinople were sought by all the aspiring youth of Europe; whilst Italy had her poets, painters, lyrics, and historians; whilst France had her troubadours, minstrels, authors, and philosophers; aye, and whilst this England of ours had its grand dramatists, poets, and thinkers, Germany possessed not even an intelligible language. These are very strong epithets, but I repeat that Germany did not even possess an intelligible language. A barbarous, rough, uncouth jargon, split into fifty dialects, served for the Teutonic race as a medium of conversation. The Suabian could not understand the Saxon dialect; the Saxon was totally different to the Hanoverian; the Hanoverian, again, was unintelligible to the Borussian; whilst the Borussian was almost a stranger to the dweller of the North Sea borders. As in all early races there were bardic effusions that served for the period as the chronicles of the times, so the Germans had their Meister-sangers, their Minnesängers, their Niebelungenlied,

their Heldenbuch, wild compounds of love, war, and romance, such as Macpherson has presented us in the book of *Ossian;* but even these effusions were the offspring of the Suabians, and the seat of the Meister-sangers was held in the cities of Mainz, Nuremberg, and Strasburg, where a little of the dulcet sounds of Italy and France could easily be wafted across the borders. Hans Sachs, one of these minstrels, wrote rhyme by the yard, but it contains the merest germs of true poetry.

Germany never took kindly either to Rome or Roman influence; from the days when Varus was defeated by Arminius in the Teutoburg forest, and caused the imperial Augustus to cry, "Varus, Varus, give me back my legions!" to the present day, there has been a continual struggle, both physically and mentally, with Latinism. The Christianity which Boniface preached to the Germans, but which was more effectually introduced by the sword of Charlemagne, had a very loose hold upon the popular mind. The belief in sprites, cobolds, nixes and elves, was everywhere prevalent among the Teutons. Every grove had its geist, every dell was haunted by a fairy, every crag was infested by cobolds, the powers of which were never doubted, but at best thought to be neutralised by a Christian formula, a cross-hilted sword, or a sainted relic; and, as even now in Africa, where the Obeah priest and the medicine man have such powerful influence upon the ignorant multitude, so the reputed witch, for many centuries after the introduction of Christianity, shared with the priest not a little of the popular dread or favour.

Split up, as the Teutonic races were politically, under numerous little potentates, it was impossible for one ruler to make a supreme effort for their regeneration. What was law in one little domain was ostracised in the neighbouring one.

There seems to have been only one common bond of union in all these tribes, and that was hatred of the Walshman. By Walshman was understood those beyond the mountains. All the Latin races were thus classified by the German, the same as our Anglo-Saxons called those beyond their mountains Welshmen, whilst the Welsh themselves know of no such appellation, but style themselves Cymraeg. So the Italians, French, and Spaniards were known to the old Teutons as Welshmen, or Walshers.

It is owing to Martin Luther, in the first instance, that the Germans possess a language.

The writer of this Paper, be it understood, has no predilection for the dogmatic teachings of this heroic man; but if there is any one human being more than another that has deserved well of his country; if there is any one man who has indelibly stamped his high genius upon a whole people, who has tended to make them what they now are, it is undoubtedly Martin Luther. The philosopher, humbly though he may endeavour to deserve that name, dare never allow prejudice to stand between himself and truth; so when the overgrown mosses of fierce hatred and prejudice have been torn away, and all traces of fungus that have clung to the name of this great German have been removed, the rough-hewn statue of the monk of Wittenburg will develop itself as that of one of the greatest literary benefactors of the Teutonic race.

We will drop all reference to the immediate causes of the quarrel of Martin Luther with Rome; but once having seceded, he laboured hard to banish Latin ideas from his people. He successfully accomplished this by his magnificent translation; magnificent, though from a critical point of view not free from error. By this huge labour he crushed at one blow all the uncouth dialects, and established a literary standard of phraseology, known as Hochdeutch, to

which, however, as we shall show, there was subsequently much refinement and polish added, though from this Hochdeutch the Germans have never materially deviated. Here at once the man of letters had a common form of expression which was tacitly accepted as a classic one. Luther was aided in his endeavours by the invention of printing, for had it not been for this new discovery, which was almost simultaneous with his time, his efforts might have perished still-born. This naturally caused his writings to penetrate every nook and corner of the dominion, whilst his preaching was only heard by the few. In addition to creating a language for the Germans, he was also a destroyer. He at one blow destroyed the lingering belief in elves, nixes, sprites, and cobolds, and gave the people a substitute in the biblical stories.

Strange as it may appear, whilst the Teutons never would accept much from the Latins, they seized with avidity the stories and psalms and lyrics of the Semitic peasants; and, whilst nothing of the Latin effusions had ever influenced the national life of the Germans, the writings in what is termed the sacred book permeated and interwove themselves in the daily life and action of the Teuton, until every warrior prated of the sword of the Lord and Gideon; every heroine called herself a Deborah; and every orator thought himself a Saul of Tarsus. Luther's versification, though very rugged, adapted itself to the popular tastes; and, through the chanting of his vigorous and manly hymns, the knowledge of Hochdeutch and classic German soon became the language of the people.

The Thirty Years' War did much to destroy the germs of literature which were now fairly implanted on Teutonic soil. When mere boys, adults, and grey-haired men had to shoulder a pike, and do battle either for the Kaiser or the Snow-King; when huge armies traversed and retraversed what were once smiling fields and lovely vineyards; when

countless villages were destroyed, cities razed to the ground, and huge fortresses levelled to the dust; when nought was heard but the moaning of the widow, the wailing of the orphan, and famished old men crying for bread, it can well be understood that the last thing to be cultivated would be the gentler muses; so that, except the German bible and Luther's hymns, there was left nothing but a literary and social chaos. There were still a few feeble attempts, but there was no real giant mind produced until the beginning of the eighteenth century, in 1724, in the person of Immanuel Kant, who, though born and trained in strict and Lutheran principles, by his *Kritic der Reinen Vernunft* has influenced every free university in Germany. It is quite impossible, in the limits of an ordinary paper, to dwell at length upon the theories which Kant has impressed upon the German people, and which, for good or evil, are now strongly influencing the Teutonic mind; but, to explain briefly, it broke with the school of our Locke, and entirely opposed dogmatic philosophy. Kant's theory is neither the offspring of tradition, sentiment, or experience; but, based upon pure argument and reason, there is nothing taken for granted except *time* and *space*, and these have to be filled in by the inquirer after truth.

These principles, though in a modified form, were originally introduced to Germany by Benedict Spinoza, who was born in 1632, in Amsterdam, of a family of Spanish Jewish exiles; when excommunicated from his congregation for his heretical opinions, he conformed to no sect, and, whilst earning his livelihood as a grinder of glasses for telescopes, ushered forth to the world several immortal works, the most important of which is *Ethics Demonstrated Geometrically*.

Of Spinoza it may be said, that he lived so pure, unsullied, and blameless a life, that even his bitterest

enemies, whether they were of the Jewish or Christian conventional orthodoxy, could not, with the exception of his nonconformity, adduce one single fault in the character or virtue of this singularly meek and unobtrusive person. Though courted by the Great Condé, and tempted by the Elector Palatine to occupy a philosophic chair in the university of Heidelberg, he remained independent, and continued his handicraft until his death; and his disinterestedness was also evinced by his refusing a legacy of two thousand guilders, bequeathed to him by an ardent admirer, named Van Vries,—for, being unmarried, he always urged that he wanted nothing.

It is from Kant that Germany has received the philosophy of Spinoza,* and thus indirectly the latter has driven in the wedge of freedom of thought more firmly, the thin end of which was first implanted by Martin Luther.

A great landmark in German literature was made by Moses Mendelssohn. He did for the German language what Alexander Pope, Addison, and others of that school, did for our own. This man is a living example of how the most obstinate difficulties, that seem almost insurmountable, are overcome by patience and perseverance. He was ushered into the world, so to say, "handicapped" with every conceivable obstacle. He was a Jew, at a period when this was equivalent to being a social pariah. He was, moreover, a cripple from his birth; and his father, a poor scribe or law-writer, could give him naught upon leaving his native town of Dessau for Berlin but his paternal blessing. So great was his poverty, that he relates that when he arrived in the Prussian metropolis, in 1742, he lived upon a turnip

* In a discussion which followed the reading of the Paper, the Rev. Professor Prag traced the teachings of Spinoza to the writings of Maimonides, a distinguished Jewish philosopher, born at Cordova, in Spain, in 1139.

daily, which he marked so that he might be able to make two meals, and not be tempted to eat the whole. Some time afterwards he obtained a situation as bookkeeper at a silk merchant's, named Bernard, and eventually became a partner in the concern, and rose to be a wealthy man. By the merest chance, he happened, at a book-stall, to purchase an English book, which prompted him to the study of our language; this eventuated in his becoming an ardent disciple of Locke, and an enthusiastic admirer of Shakespeare. He subsequently taught himself Latin and Greek; and it is said that such was the capacity of his memory that he could repeat *Virgil* by heart. In 1754, he formed an acquaintance with Lessing, then a young aspirant for literary fame, but at that time quite unknown; and also, about this period, a prominent bookseller and publisher, named Nicolai; both Lutherans of the straitest type. The warm friendship of these three persons was only terminated by death; and to these three persons modern German literature owes a vast debt of gratitude.

At the termination of the Seven Years' War, there was another attempt to Latinise German culture; and this was brought about by the predilections of Frederick the Great for all that was French and of Gallic tendency. The monarch himself encouraged only French philosophy and literature; his writings were all in that language, and the only passport to Court favour was by the adoption of French manners. Voltaire, as is known, was a resident in Berlin, and was the bosom friend of the king; and not only was Voltairianism the prevailing fashion of society, but all the current literature consisted of feeble translations of French authors, and every play produced on the stage was a weak adaptation of some French dramatist.

Mendelssohn, Lessing, and Nicolai, well knowing the

current of popular feeling ran in a contrary direction, set themselves to work to stem the tide of this literary Gallic invasion. Firstly, Moses Mendelssohn strove to euphonise the German language, created new phrases, all of Teutonic origin, but rounded and elegantly finished, so that he was enabled to compete on equal terms with the polish of the French expression. He endeavoured, in his celebrated *Morgen Studen*, or "Morning Hours," to create an epigrammatic style hitherto unknown in Teutonic literature; and, in order to wean the German people from the teachings of Spinoza and Kant, he wrote his celebrated *Phädon, or the Immortality of the Soul*, wherein he endeavoured to prove that man, after all, has a limit in human reason, and that the sum of everything is not *time* and *space*, but that wise philosophy may be cultivated, with axioms based upon the experiences of past ages. He believed with Tacitus: –

"Omnia quae nunc vetustissima creduntur nova fuere; et quod hodie exemplis tuemur inter exempla erit."

"All the most ancient things were once new; and what we now defend by example will in future be quoted as an example."

He next threw down the gauntlet to the French literary school, by introducing to the German public, for the first time, the English style of literature and thought, and ran Shakespeare against Racine and Moliere. Here he was greatly assisted by his good friend Lessing, who may be termed the father of the true German drama. Through the persuasion of Moses Mendelssohn, Lessing was induced to create his dramas, not upon French, but upon English models; and, dangerous as was the experiment, it succeeded beyond their most sanguine expectations, and he wrote a series of dramas, such as *Miss Sara Sampson*, *Emilia Galloti*, *Minna Von Barnhelm*, and culminating in *Nathan the Wise;* all founded upon the Shakesperian style, and

these effectually drove away all French adaptations. The play of *Nathan the Wise* is still one of the most favoured representations of the German classic stage. It treats of a very difficult subject, harmony with variations of opinion, the three principal characters being the Sultan Saladin, a Mahomedan; a Christian Knight Templar; and Nathan the Wise, a Jew.

Lessing was at one time accused by venomous critics of being a Pagan, with Hellenic tendencies; but this was admirably refuted by Moses Mendelssohn, who effectually proved, in a splendid *Apologia*, that his friend Lessing, if he did not believe all that the infallible Popes of Lutheranism had propounded, was, notwithstanding, a better Christian, and a truer-hearted German than many of his detractors.

The merits of Nicolai, the third in this trio of friends, must not be forgotten, for, by his practical experience as a publisher and bookseller, he gave the philosophic Mendelssohn and the dramatic Lessing the benefit of his vast experience; and, in spite of the tempting opportunity of pandering to the influence of the Gallic tendencies of the Court of Potsdam, he continued to foster among the people the love for true German literature, which, though at first gave little hope of gain, eventuated in ultimate pecuniary success.

By this time an enduring taste for all English literature had struck a deep root in German soil, owing to the labours of Schlegel and Tieck, and a host of others, who translated Shakespeare so admirably into the very rhythm and style of the great dramatist himself, that the plays of the bard of Avon were more frequently represented upon the German stage than those of their own native authors. But this had another and an unsought-for tendency, which leads us into the beginning of the present century, and necessitates our making a few reflections upon the pre-nineteenth century and the post-nineteenth century German literature.

Until, say, the close of last century, the poetry, philosophy, and general literature of Germany had only one object and one tendency, namely, the discipline of the mind, the cultivation of the beautiful, and the craving after the unknown.

The invasion of Germany by the great Napoleon, coupled with the influence of the Shakesperian drama upon the public mind, completely revolutionised the tendency of Teutonic literature. Thus the play of *Julius Cæsar* could not be represented without the audience clamouring for liberty. *Coriolanus* was almost the cause of tumultuous riots. *King John*, *Henry V.*, *Richard III.*, and *Henry VIII.*, containing, as these dramas do, strong political allusions, were eagerly taken up by the people, and there was, for the first time, a strong tugging at the political chains which had so long kept the sleeping giant from rising. The two great offsprings of this national feeling were Schiller and Goethe. These poets were the production of what may be termed the school of compromise in Germany. This section, whilst not rejecting the ideas of Spinoza and Kant, allied itself to the teachings of Moses Mendelssohn and Lessing, or rather of the Anglican school; and, whilst searching for the unknown, they would not look upon tradition and sentiment as so much rubbish only obstructing the path of truth; they rather treated tradition and sentiment as crutches, enabling the lame to walk until he might eventually dispense with these aids. But Schiller struck an original path for himself. Fight, if you will, thought he, for the liberty of the mind, but, before all, fight for the liberty of the person. To accomplish this for the German people seems to have been the task of his life.

There existed no Press at that period in Germany, in our modern acceptation of the term, the journals of those days

reporting merely local events, theatrical criticisms, and financial quotations. Leading articles on political occurences were rigidly forbidden by the Government Censor. There was only one vehicle left for the expression of public opinion, viz., the drama and the stage; and here Schiller unfolded to the mind a lavish profusion of grand historical pictures.

His *Don Carlos* roused the people to fury by the depiction of the incapable Philip II. of Spain, who frittered away the grand resources of a noble people. His *Cabale und Liebe*, "Love and Intrigue," stung like an adder at the petty intrigues of the German microscopic principalities, and dealt "caste" a reeling blow. The *Maid of Orleans* gave the Germans new hopes of political regeneration. His *Maria Stuart*, *The Death of Wallenstein*, and *The Conspiracy of Fiesco*, all written with a purpose, culminated in his *Wilhelm Tell*, one of the few perfect dramas that exist.

It is here that he throws his whole soul into the work of the political resurrection of his country, veiled, of course, by a semblance of Swiss independence; and his last lesson to the German people is given in these words of Attinghausen, who, when dying, mutters: — "Cling ye one to another, firm and for ever! Let no free city be a stranger to another. Preach it high upon your mountains, that all your States shall quickly join as one. I charge ye, Unite, unite, unite!"

No one can describe the effect upon the German people of those last words, "Seyd einig, einig, einig!"

I remember, in 1861, the first time I ever visited Germany, seeing *William Tell* represented in the Berlin "Opernhaus," when the whole audience sprang to their feet, and shouted "We will, we will!"

As Englishmen, we who have enjoyed constitutional freedom so long cannot imagine its effect; and, without

doubt, the possession of the long-wished-for unity by the German people will eventually weaken the force of this sentiment, even with them.

Goethe was, without doubt, from a philosophic point of view, the superior of Schiller; though the latter was much more national in his feelings, still Goethe, by his *Egmont*, a drama depicting the rising in the Netherlands, materially aided the cause of political literature; but Goethe was much too *vielseitig*, as the Germans would call it, that is, many sided—he touched upon the whole range of human wisdom—to have been a truly political writer. His *Faust*, the great masterpiece of poetic literature, is even now a vast riddle which every one solves after his own particular mode of thought. I would venture to believe that it was written as a compromise between the philosophy of Spinoza and Kant, and traditional and conventional orthodoxy. Faust yearns for the unknown, has sacrificed every earthly pleasure for the one unattainable object. The mind of Faust, encased within the frail human frame, succumbs to that which is earthly and natural. A girl, Gretchen, and rejuvenation, is the exchange he receives for aimless philosophy. Faust, safe in his early career of isolation, now runs riot, and is lost by contact with the world and things worldly, his old philosophy availing him nought when brought face to face with daily life; he is only saved in the end from utter misery by the conventional orthodoxy of Gretchen, upon whom he leans rather than follows. The last words of Faust are most suggestive—

> "Im vorgefühl von solchem hohen Glück
> Geniess ich jetzt den höchsten Augenblick."
>
> "In the mere hope of eternal bliss
> I now feel eternal bliss indeed."

I dare not mention a tithe of the many illustrious names

that have adorned the Valhalla of German literature and philosophy. I must pass Fichte, Hegel, Schelling, Herder, Humboldt, Varnhagen Von Ense, and many others, confining myself only to the leaders and not their followers, and now proceed to treat upon the newest and latest phase in Teutonic thought.

When the great Napoleon was vanquished, and the German people returned to their homes, after having fought and bled for the independence of their country, they awoke to find themselves the victims of a terrible delusion. After all their sacrifices, the net result to the people seemed to be increased taxation and a change of masters, a prince bearing a German instead of a French name. The various kings, grand dukes and other princelets combined among themselves, and, scared by the nightmare of revolution, strove to repress every symptom of free thought; and a curious alliance took place, from 1815 to 1830, between the Ultramontanes and the teachers of extreme Lutheranism, and prompted the governments to banish and proscribe all ideas that were at variance with strict legitimacy or orthodoxy. England was cited as a wretched, unfortunate country, without the moral courage to rid itself of that odious constitutional system which must eventually swallow it up in a whirlpool of revolution and terror.

Naturally, a violent reaction took place against the teachings of this system, which was mainly fostered among the students in the various Universities; they formed themselves into clubs, called Burschenschafften, or Boyships, and strove to the utmost to combat the formal piety which was at that period the prevailing tone of good society.

That happy compromise which had been inaugurated by Schiller and Goethe was thrown to the winds, and the ethics of Spinoza and the teaching of Kant came to the forefront again; indeed, by many intelligent minds, it began to be

discussed whether Napoleon was the great monster of evil that their rulers had taught them to believe; and the thought entered their minds, and not unjustly, that the overthrow of many abuses and antiquated and useless institutions was not a little due to the influence of this child of the French Revolution, and that this great upheaving of modern society, like the rising of the Nile, which, for the time being, carried havoc and destruction in its course, had, notwithstanding, left sufficient fertilising material in its train to compensate them for their temporary troubles and losses. There was just a little hankering again after Latinism. Every student spoke of Cato and of Cicero and Brutus, when again a saviour appeared to the Teutonic philosophic and political world in the person of Henry Heine.

If you ask a young German to-day which is his favourite author, he will tell you Henry Heine. Ask the mature German, who has contributed most to forming his ideas, most probably he will say Heine. Ask a German matron, whose ballads please her most, and you will elicit the name of Heine. And if you see a coy maiden emerge with a book from her boudoir, and with her eyes half suffused with tears, it is more than probable that Heine's verses have been the cause of her distress. It would be difficult to compare Henry Heine with any one of our English authors, but he might be defined as possessing the peculiarities of three of our distinguished men; he is very much of a Byron, a little more of Macaulay, with a dash of Tom Hood the elder. To him Germany largely owes her present literary and political independence; aye, even as much as to the redoubtable Bismark and Moltke.

One of Heine's English critics, Edgar Alfred Bowring, says: "Comparatively little known and little appreciated in England, the name of Heine is in Germany familiar as a household word, and while on the one hand many of his

charming poems have become dear to the hearts of thousands and tens of thousands of his fellow countrymen, and are sung alike in the palace and the cottage, in the country and in the town, on the other hand his sterner works have done much to influence the political and religious tendencies of the modern German school."

Thus far the critic, who is accurate in every word.

Crossed in his affections in early life, while yet in his teens he wrote songs, as he says, to sing that he might not weep. Or, in his own words—

On my life, a life of darkness,
Once a vision sweet shone bright,
Since that vision sweet hath faded
I 'm now veil'd in utter night.

When in darkness children wander,
Soon their spirits die away,
And to overcome their terror
Some loud song straight carol they.

I, a foolish child, am singing
In the dark that 's spread around;
Though my song may give no pleasure,
Yet mine anguish it hath drowned.

Heine's principal weapon lay, however, in his satire—a satire that spared neither rank nor degree—and much as it is to be deplored, it spared not that which men hold most sacred; it was the natural reaction of the pietism and hypocrisy which was predominant after the Napoleonic wars.

The Grenadiers is as popular in France as in Germany; I give it you in its English guise—

Two grenadiers travelled towards France one day,
On leaving their prison in Russia,
And sadly they hung their heads in dismay
When they reached the frontier of Prussia.

For there they first heard the story of woe,
That France had utterly perished,
The grand army had met with an overthrow,
They had captured their emperor cherished.

Then both of the grenadiers wept full sore
At hearing the terrible story,
And one of them said, Alas! once more
My wounds are bleeding and gory.

The other one said, The dream 's at an end,
With thee I would die right gladly,
But I 've wife and child at home I must tend,
For without me they 'd fare but badly.

What matters my child, what matters my wife,
A heavier care has arisen,
Let them beg, if they 're hungry, all their life,
My emperor sighs in a prison.

Dear brother, pray grant me this one last prayer,
If my hours I now must number,
O take my corpse to my country fair,
That there it may peacefully slumber.

The legion of honour, with ribbon red,
Upon my bosom place thou,
And put in my arm my musket dread,
And my sword around me brace thou.

And so in my grave will I silently lie,
And watch like a guard o'er the forces,
Until the roaring of cannon hear I,
And the trampling of neighing horses.

My emperor then will ride o'er my grave,
While the swords glitter brightly and rattle,
Then armed to the teeth will I rise from the grave,
For my emperor hastening to battle.

With pardonable egotism he used to say he was the first man of this century, as he was born on January 1st, 1800.

Heine's mode of treating Germany was similar to that, if I may use a homely simile, of a boy with a whipping-top; he lashed Germany until he made it spin, or, like a physician, he used such strong counter-irritants so as to bring the evil to the surface. He would taunt the German, in prose and poetry, that Britain ruled supreme on the wave, France upon the land, whilst Germany held undisputed sway over the clouds. Whilst, he said, England loved liberty like a wife, possessing it, loving it, and cherishing it, France loved liberty like a sweetheart, always coquetting, yet never wedding, whilst Germany loved liberty like her old grandmother.

His terrible and withering sarcasm upon the petty princes in Germany, and upon the cloudy policy of Frederick William IV. of Prussia, caused an order for his arrest, but, being warned from a friendly source high in favour at court, he escaped to France, where he resided until his death. When taunted by his opponents with his flight, he retorted that all distinguished men fled once in their lives. He said that Moses fled from Egypt; Jesus fled with his parents from Palestine; Mahomet fled to Medina; Henry Heine fled to Paris; and, to cap all, the great king of Prussia and his whole army fled from Napoleon at Jena.

From Paris he launched his thunderbolts against all that was effete and rotten in the old Germanic system. His influence with the German people was positively unbounded. The *Augsburg Gazette*, to which he contributed articles, caused a vibration throughout the whole empire.

In a magnificent poem, entitled *Germany*, he thus addresses the king—

O king, I really wish thee well,
When this advice to thee I 'm giving;
Due reverence pay to poets dead,
But tender be to the living.

Affront the living poets not,
With weapons and flames they are furnished,
More terrible far than the lightnings of Jove,
By the poets created and burnished.

Is Dante's hell to thee unknown,
With its terrible trinary verses?
The man whom the poet has there shut up,
Will never escape from his curses.

When Louis, king of Bavaria, built the celebrated Valhalla in Munich, he placed therein the statues of all German worthies, from Teut, the founder of the Teutons, to Schinderhannes, the celebrated brigand; but, being a good son of the church, he would not include Martin Luther. In a poem, directed to king Louis, Heine has this verse—

But Luther, the blockhead amongst them all,
Has no place in this proud mausoleum;
The whale 'mongst fishes is often left out
In a natural history museum.

It is much to be deplored that the great influence which Heine exercised upon the German mind, brought with it also a spirit of doubt in all tradition, whether sacred or otherwise. Indeed, Heine called himself a Greek and a Pagan, though during the eight last years of his life, when he was confined to a bed of sickness, he employed most of his time in reading the Scriptures.

Of his beloved fatherland he writes—

Beauteous cradle of my sorrow,
Beauteous grave of all my peace,
Beauteous land, we part to-morrow,
Fare-thee-well, our ties must cease.

Fare-thee-well, thou threshold holy,
Where my loved one sets her feet;
Fare-thee-well, thou spot so holy,
Where we chanced at first to meet.

And my limbs in wanderings dreary,
Sadly drag I full of gloom,
Till I lay my head, all weary,
In a chilly, distant tomb.

And of himself he mournfully utters—

Not one mass will e'er be chanted,
Not one Hebrew prayer be muttered;
When the day I died returneth,
Nothing will be sung or uttered.

Some of Heine's political prophecies are truly remarkable, such as his description, in a minutely exact manner, of the probable fall of Louis Philippe and his escape to England, written some ten years before the event took place; also his forecast of the destruction of the Vendome Column by the Communists; also the taunt, when the Parisian fortifications were being built by Louis Philippe, that they would be a stone shroud to beleaguered Paris, and would be the means of her starvation, not as the French thought, their salvation; he also predicted that the first war between France and Germany would eventuate in the loss to the French of Alsace and Lorraine;* he also foreshadowed a circumstance which has not yet been fulfilled,—he says, "Poor Napoleon, well had it been for thee had thy people allowed thee to slumber peacefully in St. Helena's Isle; the English would never have disturbed thee. Once let Communism get fairly hold of France, and they will take thy ashes from the Invalides and throw them into the Seine, as a vain-glorious tribute to universal brotherhood."

* Heine died in 1855, long before the Franco-Prussian war was ever dreamt of.

If we pass in review all the great minds that Germany has produced—and they are not a few—none have influenced the latest phase of German thought to a greater extent than the poet Henry Heine.

Whether Heine was ever reconciled to traditionary belief remains unsettled to this day. I venture to think he *was*. Among his last verses, written shortly before his death, are these—

> The body to poor soul replied,
> Cheer up, be not dissatisfied,
> We peacefully must learn to bear
> What Fate apportions as our share.
> I was the lamp's wick, I must now
> Consume away; the spirit thou
> Wilt be selected by-and-by,
> To sparkle as a star on high
> Of purest radiance. I 'm but rags,
> Mere stuff, like rotten tinder bags,
> Collapsing fast, and nothing worth,
> Becoming what I was—mere earth.

* * * * * * * * *

There is a little mound of earth in the cemetery of Pere la Chaise containing all that was mortal of Henry Heine. Germans visiting Paris, make a pilgrimage to this spot. Even strong, sturdy men are not ashamed of a tear, and why should they be, for does not that hallowed ground contain one of the men who made their German Empire?

ON SOME TABLETS FOUND IN EASTER ISLAND.

By J. LINTON PALMER, F.S.A., F.R.G.S., R.N.

In a Paper I had the honour of reading to this Society last year, *On Easter Island*, I mentioned that, among other curious relics found, there were some small tablets of hard wood, incised with symbols whose meaning was unknown; and I stated that I was taking steps to assure myself of the truth of various reports concerning them. As many members now here may not then have been present, may I be allowed to give a short account of these things, of whose appearance the casts and photographs on the table convey a fair representation.

There are but eight of these tablets now known. Four are in Tahiti; two in Chile; two in Russia.

The first three were obtained by the Chilian exploring expedition of 1870, of which one was lost on its passage to France. They were found in the half-underground stone-houses, near the Great Crater. We are told that, in 1864, they were common enough, but that most of them were destroyed after the coming of the Missionaries. Strangely enough, we have not yet met with similar tablets in any of the various groups of islands in the South Seas.

The tablets, as you see, are grooved into shallow channels. In them are incised figures and symbols; some very grotesque; some seemingly copies of such objects as birds, fish, eggs, &c.; some are compounded of these and an arbitrary mark; some seem simple arbitrary marks. We are told by the first Missionary that each symbol had its own signification (nombre), and that they were still copied by the

natives, many of whom had forgotten their primary meaning; and, again, that but little importance was attached to these tablets.

The characters in the grooves are reversed, cut upside down in every alternate line, so as to prevent confusion in reading them. This method is called *Boustrophedon*, and was used by various ancient nations, *e.g.*, the Greeks. Instances occur, also, among the Himyaritic inscriptions lately found in South Arabia. They seem also to be divided into paragraphs by a vertical line of half-a-dozen nicks.

No sooner had these casts arrived in England than several savants began the task of trying to decipher them. Of these, Mr. Park Harrison seems the most zealous. He has read two Papers (now on the table) about them, before the Anthropological Institute. As, however, he had no Rosetta stone, so to say, by which to correct his suppositions, his attempts do not seem to have had the success they merited; and I must confess that my eyes do not see the symbols as he describes them. I have not been able to find out whether anything to this end has been done on the Continent, whither some of the casts were also sent from Chile.

Mr. Croft, who lately resided at Tahiti, sent photographs of the four tablets there hither and thither; but I have not heard that he made any researches into their meaning, though he says he found a native who could read them, and that they were about the religion, land-tenure, history, &c., of the islanders.*

By the last mail I received from our Consul-General at

* In Mr. Harrison's last Paper, we read:—"An Easter Islander in Tahiti professed to be able to read the tablet, but was unable to do so. He had partially learnt to do so, but would only say the signs stood for ideas and sentences." Mr. H. sent photographs of the cast of a tablet, now in Chile, to Tahiti, and found, in a letter sent in reply, that the tablet is "one of those which says a good deal about their chiefs," and that some explanations he offered were correct.

Tahiti, in answer to my queries, a letter, four photographs, and a notice, which, though brief, is of great interest.

The Notice is from Monsignor Tepano Jaussen, Bishop of Axieri, Vicar Apostolic of Tahiti. It contains the following details :—

Of the four tablets in the Roman Catholic Mission at Tahiti—

One contains	1547	characters	in 16	lines.
Another "	1135	"	" 22	"
" "	822	"	" 17	"
The fourth	806	"	" 28	"
In these	4310	"		

The sign for Earth occurs 362 times.
" for Sky or Heaven occurs 115 times.
" for Man " 454 "
" for Bird " 261 "

The following is an extract from the letter of Consul-General George Miller :—

"Monsignor, some time since, assisted by some of the Easter Islanders now in Tahiti, undertook the task of endeavouring to decipher these characters, and has filled a considerable number of sheets with the notes of his, as yet, unfinished work—now laid aside for awhile, but which he intends to resume at some future opportunity—intending eventually to publish the results in the periodical of his own Society, the *Picpus*, which, he frankly says, he wishes to have the benefit of first giving publicity to the fruit of his labours. Hence the brevity of the notice. But he has, however, expressed, more than once, his decided opinion that the tablets record nothing of importance, and that, though the characters inscribed on them may be of ancient origin, yet the work itself is modern, and relates nothing, he is convinced, beyond the stories of a child-like ignorant people.

"It would seem that, in certain districts of Easter Island, 'wise men' taught the art of reading or reciting from these tablets, some of which may still be found preserved among the few remaining inhabitants left on the island. Those of them who were brought to Tahiti included among their number some who said they could read this picture-writing; and some have chanted or recited to the Bishop from his tablets little tales of the simplest kind, such, in fact, as these islanders might be expected to be capable of producing."

This is the sum of the communication; and let us hope that the labours of Monsignor will soon be published. If the "simple tales" mentioned are but the folk-lore of the islanders, they will yet be acquisitions. How much labour has not the late Dr. Bleek expended on the folk-lore of the Bushmen? How much exertion has not been used to collect that of other nations and tribes?

It may be that these tablets are only the "Horn-books," and we may yet obtain those of the records.

I show some of these incised characters, enlarged, to give an idea of the apparent hopelessness of attempts to decipher their meaning without an accompanying translation of the contents of one tablet into some known character; nor will this be the less apparent when we consider other circumstances attending the use of *hieroglyphics*, as this style of communicating ideas is called.

We have, as you know, but two methods by which we usually communicate or interchange our ideas:—

1st. By sound—Music.
Articulate speech.

2nd. By sight—Gesture.
Symbol.

I omit the technical mode used for the blind.

1st, Music.—If you think this far-fetched, may I tell you that, when I was in the Sandwich Islands, 1851–52, there was in use among the natives a kind of Jew's harp, made of wood, and strung like a small bow. This was played on by the mouth and fingers; and a young couple, seated on either side of a ravine or small valley, would, by the tones of this instrument, communicate their ideas one to the other. Its use was found to be so sensational, and to lead to so much waste of time (to say the least) by courting, that the practice had to be suppressed by the Missionaries. The same practice existed in the Marquesas Islands. So it is not the only instance of "Lieder ohne Wörte"; and you will find, in one of the prettiest of the Polynesian legends—that of *Hine-moa*—told by Sir G. Grey, in his *Mythology* (p. 233), how, in a similar case, the hero "Poured through the mellow horn *his* plaintive soul."

Speech and Gesture require no comment.

2nd, Symbol, may be divided into—

Picture-writing.
Hieroglyphs.
Character-writing.

Picture-writing.

Picture-writing is found to have been used over all the known world, Old and New.

1. Strahlenberg tells us that in many parts of Siberia are to be found rocks covered with picture-writing.

2. Charlevoix tells us how the various tribes of North American Indians sent news and tidings, as well as keeping their current history, by skins and pieces of bark and wood, on which figures were painted. I think you will find this mentioned also by Catlin and others.

3. Humboldt describes, in his *Ansichten*, the sculptured rocks found in the valleys of the rivers Orinoco and Cassi-

quiare (the Piedras Pintadas of Hortsmann), on which are incised figures of wild and domestic animals, snakes and other reptiles, birds, etc., and gives the tradition of the present natives as to the people who engraved them. They extend over a district of 200,000 square miles, nearly 8° of longitude.

4. Sir R. Schomburck tells us of similar inscriptions near the river Essequibo, in British Guiana, and that they are so numerous and well done as to merit the attention of future travellers.

5. In Mexico, where this mode was far advanced, from the people being so civilised, not only were copies put of those things which had bodily shape, but also arbitrary marks for things abstract, or having no determinate form, as the air.

6. In the Friendly Islands was found the painted cloth (tappa) I spoke of, which was brought to England by Captain King, the companion of Captain Cook, in which Mr. Astle traced resemblances to the figures of the Mexican picture-writing.

7. In Europe, certain Hungarian inn-keepers kept their accounts in this method, not only of the amount owed by the debtor, but also of his quality or occupation, as by putting a sword to represent a soldier, a whip for a carter, and so on.

Hieroglyphs.

Hieroglyphs, properly understood as such, are the ideographs which were used by the ancient Egyptians, their system making a very perfect method, of which I will give as brief an account as I can.

The signs employed are divided into three classes.

Simple or Natural Ideograms.

Generic or Determinative Ideograms.

Phonetic Ideograms.

Simple Ideograms.

Pure Pictures,	or copies, make the	Mimic signs	a Cow	is Cow.
	If we wish to describe a			
Quality,	employing metaphor, we put	Tropic or Converted signs.	Red Bird	for Red.
Attribute.			Jackal	for Wise Priest.
Emotion.			Ape upright	Anger.
	If we wish to express action we put		Hand	
Cause for effect or *vice versâ*.			Plough	Digging.
			Eye	Seeing.
			Pool	River Nile.
			Bunch of Reeds	Lower Egypt.
	To prevent multiplication of signs (by Synechdoche) we put	Contracted signs.	A Bird's Head	for Birds.
			Pupil of Eye	for Eyes.
	Generally used for Divinities,	Enigmatic or obscure signs.	Ibis	for god Thoth.
			Seated Ass.	for god Typhon.

Phonetic or Cyriologic Ideograms.

In these, a word is spelt by taking in succession the initial letters of the names of various objects. So that any name, form, or abstract idea may be rendered by the sound of the group.

For example, an ash-tree.

A, an ant; S, a swallow; H, a hog.

But, as this may be quite misunderstood by reading pig for hog, to ensure it is a tree and not a serpent we are talking of, we append its generic sign.

Generic or Determinative Ideograms.

These signs, determinative (of sound), as Bunsen calls them, are modifications of the tropic or converted signs. They are about two hundred in number, and in that respect resemble the Chinese Radical characters. They always *follow* the group which gives the special idea; so every perfect word consists of this combination.

For example, the determinative for skin is appended to the phonetic group signifying skin; leather, anything made of either; and, lastly, by amplification to animal, several kinds of animals.

From the foregoing, it is evident that mistakes without number may be made in endeavours to translate without a standard to refer to. And you may ask, Why waste so much time on so dry-as-dust a subject? But is it so? as we find that these systems have been so universally used as an exponent of human thought and history. Who can assure us that some valuable kernel may not be found in this hard and uninviting nut?

I must apologise for so long trespassing on your time and attention. My only excuse is—

"Homo sum
Humani nihil a me alienum puto."

Thurlow Weed . 1876.

In the Plate I have delineated a number of the symbols inscribed on the tablets, about the same size as the originals, and taken indifferently from the casts and photographs. I have not copied all the simple forms, and, of course, there are many more compound signs.

A constant figure in the casts is the one like fig. 2, line 4, clasping a post or pillar. Fig. 3, line 2, has often four little fins, like turtles' flippers, appended. The first figure, first line, seems to divide the contents into sentences. Sometimes two or three similar figures are joined together in line, as in the case of the hawk-headed figure.

There is considerable difference, also, in the size, finish, and execution of the originals in the various tablets.

THE HOUSE OF STANLEY AND THE LEGEND OF THE EAGLE AND CHILD.

By JAMES A. PICTON, F.S.A.

Students of history have come at last to recognise the supreme importance of consulting contemporary documents, where such exist. Without this, history is reduced to the condition of an idle romance, or a vehicle for party prejudice. I propose to illustrate this principle by reference to a little episode of English history bearing upon a family illustrious in the annals of our peerage, and never more so than at the present time.

The Chetham Society have recently issued a volume of Lancashire Inquisitions in the thirteenth and fourteenth centuries, from the Towneley and Dodsworth Collections. The information afforded as to the state of society at that period is curious and valuable. The documents are of the highest authority, being returns to writs from the Crown on evidence, on oath, before juries or commissions, in respect to the property of feoffees of the Crown or Duchy of Lancaster. Several of them refer to the family of Lathom, and the Stanleys their successors, at their first emergence into notice in the reign of Richard II.

The rise of the Stanley family has a legendary history attached to it. This is fully set forth in the *History of the House of Stanley*, by John Seacome, 1741. The original legend runs as follows: Sir Thomas de Lathom, early in the fourteenth century, walking with his Lady, who was childless, in his park, drew near to a desert and wild situation, where it was commonly reported an eagle built her nest, and,

upon their near approach thereto, heard the cries of a young child, which was found by their servants in the nest, being a male infant dressed in rich swaddling clothes. And they, having no male issue, looked upon this child as a present sent from heaven. They took it under their protection, had it carefully nursed, and baptised by their own name. The child became their heir, and at his death left an only daughter named Isabel, whom Sir John Stanley married, and, in memory of this event, took the eagle and child for his crest, as since used by his noble successors the Earls of Derby.

The legend, as modified by Seacome, commences with Sir Thomas de Lathom, who lived in the reign of Edward III.; that he and his lady being highly advanced in years, without any issue but one daughter, and he being desirous of male issue, but despairing thereof by his own lady, had a love intrigue with a young gentlewoman of his acquaintance, who bore him a son, whereof he was greatly rejoiced; but the difficulty arose how to introduce this young scion without inducing domestic strife. After several schemes and proposals, they hit upon the expedient of placing the child, richly dressed, in the vicinity of an eagle's nest, where it was found by the servants, and received by the lady with kindness and affection. The child was baptised by the name of Oskatell de Lathom, his mother's name being Mary Oskatell. The youth did not ultimately succeed to the family estates, which descended to Isabella, Lady de Stanley; but he was portioned off with certain manors at Irlam and Urmston, near Manchester, and other lands in Cheshire. Sir Thomas, in memory of the event, is stated to have assumed for his crest an eagle upon wing regardant, and that the Stanleys, despising Oskatell and his pretensions, took upon them the eagle and child in token of contempt of his claims.

The legend, whichever form be adopted, presents absurdity on its face. The eagle bearing a shield, emblazoned or, on a chief indented az. three bezants, is found on a seal of the father of the Sir Thomas to whom the legend attributes it. The legend itself is as old as the time of King Alfred, to whom a similar incident is ascribed.

Seacome records that Sir John de Stanley, second son of Sir William de Stanley, of Timperley, was born in the 27th or 28th year of King Edward III. (1354), and that he distinguished himself at the battle of Poictiers, under the Black Prince, in A.D. 1357. This was very remarkable, as, according to the chronology, he was then three years old!

He further relates that on Sir John's return from France he visited most of the Courts of Europe, where his superior skill in arms was generally applauded; that on his arrival in England he conquered a haughty French champion in the jousts at Winchester, under the eyes of the Court, among whom was the heiress of Lathom, young, beautiful, and rich, by which feat he won the fair lady and gained her inheritance.

As Lady de Stanley's eldest child was not born until thirty years after this event, the strong probability is that she was not then in existence; and the doughty victor himself could not have been more than six years old!

Now let us see what light is thrown on the subject by the documents to which I have called attention. They prove demonstratively that the story, in whichever form it is presented, is a fiction from beginning to end. The true narrative is as follows:—

Sir Thomas de Lathom, the father of Lady de Stanley, so far from being childless, or having only a daughter, had five children, two sons and three daughters, all of whom attained maturity. His second son, Edward, died before his father, leaving a widow. Sir Thomas died in March, 1382.

His elder son, Thomas, succeeded, and inherited the estates, which he only enjoyed a year and a half, dying Nov. 3, 1383, leaving a posthumous daughter, Ellena, born three months after her father's decease. At her death, issue in the male line having failed, Isabella, the eldest daughter, who had married Sir John de Stanley, succeeded, in ordinary course, to the property, which has descended to the Stanleys, Earls of Derby, to the present day.

Lady de Stanley survived her husband a few months, dying on Oct. 26, 1414. On March 12 previously, she had settled the estates on Henry de Halsale, Archdeacon of Chester, and Richard de Stanley, Parson of Walton Church, in trust for her son, the second John de Stanley, then aged twenty-eight years. The specific manner in which the Inquisitions deal with the property of Sir Thomas de Lathom precludes the idea of any supposed Oskatell inheriting or even existing.

An Inquisition, 8 Richard II. (March 6, 1385), draws a lamentable picture of domestic life. Poor Sir Thomas, so far from being the "galantuomo" the legend represents, was himself the victim of his second wife's frailties. The document states that Johanna, the lady in question, had formed an adulterous connexion with Roger de Fazakerlegh, and, her husband being in a feeble state of health, she had introduced the said Roger into the hall at Knowsley, "in magnum dispectum dicti Thome mariti sui," "et jacuit cum Rogero de Fazakerlegh adultero suo apud Knoweslegh in alta camera in lecto predicti Thome mariti sui et in aliis locis secrete et aperte ad voluntatem ipsius Johanne," &c. It is further related that at her husband's decease she had carried his corpse to the Priory of Burscough, and there interred it without priest or religious rites, and immediately thereafter, being then pregnant, she had intermarried with the said Roger, her paramour. It does not appear that Lady de

Stanley and her husband at all interfered on poor Sir Thomas's behalf. It is more than probable that they were not married until after his decease.

It appears to me that the circumstances here related indicate pretty clearly the origin of the crest of the eagle and child. The eagle already existed as the cognizance of the Lathom family, and passed with the estates to the Stanleys. The illegitimate offspring of Johanna, above alluded to, if a son, would *primâ facie* have a claim to the inheritance, which the report in the Inquisition would set aside. What, therefore, more natural than the adoption of the device of the eagle of the Stanleys triumphing, or, metaphorically, picking out the eyes of the babe in the cradle?

The traditionary account of these circumstances, garbled and modified as such stories usually are, crystallised into the myth of the illegitimate babe Oskatell. This is strongly confirmed by the language of the legend itself, which goes on to say that "Sir Oskatell, being degraded and supplanted in the hopes and prospect of an immense fortune, was slighted and despised by his unthought-of rivals, who, either to distinguish or aggrandise themselves, or in contempt and derision of their spurious brother, took upon them the eagle and child for their crest, in token of their conquest over him."

It is to be feared that many a pretty legend, when tested by the dry light of documentary evidence, will, in a similar manner, turn out "the baseless fabric of a vision," but "veritatis simplex oratio est."

THE JANAL 14-ACRAL 14-EDRA.

By T. P. KIRKMAN, M.A., F.R.S.

Many years ago I was led, by my curiosity about autopolar polyedra, to construct to a certain extent the tables of the 14-acral 14-edra. As the janal tables are complete, it may be worth while to preserve a summary of them. They give an idea of the rate at which the janal-anaxine solids increase. Of these there are (Vol. xxix., 1874–5, p. 268,) sixty-four among the 14-acral 12-edra, and three hundred and fifty-two among the 14-acral 14-edra.

Table A.—Janal Solids of the 14-Acral 14-Edra.

1. Six zoned triaxines.
2. Fifty-nine 2-ple monaxine monozones.
3. Three hundred and fifty-two janal anaxines.
4. Thirteen zoneless triaxines.

Table B.—Janal Poles on the 14-Acral 14-Edra.

Two-zoned polar faces.—(4) = 5; (6) = 1.
Two-zoned polar summits.—(4) = 5; (6) = 1.
Zoned polar edges.—(55) = 1; (44) = 2; (33) = 3.
Zoneless polar faces.—(4) = 20; (6) = 4.
Zoneless polar summits.—(4) = 20; (6) = (4).
Zoneless polar edges.—(55) = 13; (44) = 27; (33) = 10.

Table C.—Janal Monozone Features of the 14-Acral 14-Edra.

Janal monozone faces.—(7) = 3; (6) = 13; (5) = 18; (4) = 40; (3) = 58.

Janal monozone summits.—(7) = 3; (6) = 13; (5) = 18; (4) = 40; (3) = 58.

Janal zonal edges.—(55) = 11; (44) = 28; (33) = 23.

Janal epizonal edges.—(37) = 3; (36) = 9; (34) = 29; (35) = 10; (44) = 1; (45) = 9; (55) = 1.

TABLE D.—JANAL ANAXINE FEATURES OF THE 14-ACRAL 14-EDRA.

Janal anaxine faces.—(7) = 6; (6) = 79; (5) = 368; (4) = 846; (3) = 1309.

Janal anaxine summits.—(7) = 6; (6) = 79; (5) = 368; (4) = 846; (3) = 1309.

Janal anaxine edges.—(37) = 36; (47) = 15; (56) = 33; (55) = 125; (46) = 181; (45) = 639; (36) = 299; (35) = 934; (44) = 578; (34) = 1427; (33) = 629.

TABLE E.—THE JANAL SOLIDS, GROUPED BY THEIR FACES AND SUMMITS.

1. *Zoned Triaxines.*

1 of $6^2\,4^4\,3^4\,3^4 = 4^2\,3^4\,4^8$.
1 of $4^2\,3^4\,4^8 = 6^2\,4^4\,3^4\,3^4$.
1 of $4^2\,5^4\,3^4\,3^4 = 4^2\,3^4\,4^8$.
1 of $4^2\,3^4\,4^8 = 4^4\,5^4\,3^4\,3^4$.
1 of $4^2\,4^4\,4^4\,3^4 = 4^2\,3^4\,4^8$.
1 of $4^2\,3^4\,4^8 = 4^2\,4^4\,4^4\,3^4$.

2. *2-ple Monozone Monaxines.*

2 of $4^2\,3^2\,3^2\,5^4\,3^4 = 4^2\,3^2\,3^2\,5^4\,3^4$, both autopolars.
2 of $4^2\,3^2\,3^2\,5^4\,3^4 = 4^2\,3^2\,3^2\,4^4\,4^4$.
2 of $4^2\,3^2\,3^2\,4^4\,4^4 = 4^2\,3^2\,3^2\,3^4\,5^4$.
1 of $4^2\,3^2\,3^2\,4^4\,4^4 = 4^2\,3^2\,3^2\,4^4\,4^4$, autopolar.

2 of $6^2\,4^4\,3^4\,3^4 = 6^2\,3^2\,3^2\,4^4\,3^4$.
3 of $6^2\,4^4\,3^4\,3^4 = 5^2\,3^2\,4^2\,3^4\,4^4$.
1 of $6^2\,4^4\,3^4\,3^4 = 4^2\,3^2\,3^2\,5^4\,3^4$.
1 of $6^2\,4^4\,3^4\,3^4 = 4^2\,3^2\,3^2\,4^4\,4^4$.
1 of $4^2\,5^4\,3^4\,3^4 = 6^2\,3^2\,3^2\,4^4\,3^4$.
4 of $4^2\,5^4\,3^4\,3^4 = 5^2\,4^2\,3^2\,4^4\,3^4$.
1 of $4^2\,4^4\,4^4\,3^4 = 6^2\,3^2\,3^2\,4^4\,3^4$.
5 of $4^2\,4^4\,4^4\,3^4 = 5^2\,4^2\,3^2\,4^4\,3^4$.
2 of $6^2\,3^2\,3^2\,4^4\,3^4 = 6^2\,4^4\,3^4\,3^4$.
3 of $5^2\,3^2\,4^4\,4^4\,3^4 = 6^2\,4^4\,3^4\,3^4$.
1 of $4^2\,3^2\,3^2\,5^4\,3^4 = 6^2\,4^4\,3^4\,4^4$.
1 of $4^2\,3^2\,3^2\,4^4\,4^4 = 6^2\,4^4\,3^4\,4^4$.
1 of $6^2\,3^2\,3^2\,4^4\,3^4 = 4^2\,5^4\,3^4\,3^4$.
4 of $5^2\,4^2\,3^2\,4^4\,3^4 = 4^2\,5^4\,3^4\,3^4$.
1 of $6^2\,3^2\,3^2\,4^4\,3^4 = 4^2\,4^4\,4^4\,3^4$.
5 of $5^2\,4^2\,3^2\,4^4\,3^4 = 4^2\,4^4\,4^4\,3^4$.
1 of $7^2\,4^2\,3^2\,3^4\,3^4 = 4^2\,4^4\,4^4\,3^4$.
1 of $7^2\,4^2\,3^2\,3^4\,3^4 = 4^2\,5^4\,3^4\,3^4$.
1 of $7^2\,4^2\,3^2\,3^4\,3^4 = 6^2\,4^4\,3^4\,3^4$.
1 of $6^2\,5^2\,3^2\,3^4\,3^4 = 6^2\,4^4\,3^4\,3^4$.
1 of $5^2\,5^2\,4^2\,3^4\,3^4 = 4^2\,4^4\,4^4\,3^4$.
1 of $4^2\,4^4\,4^4\,3^4 = 7^2\,4^2\,3^2\,3^4\,3^4$.
1 of $4^2\,5^4\,3^4\,3^4 = 7^2\,4^2\,3^2\,3^4\,3^4$.
1 of $6^2\,4^4\,3^4\,3^4 = 7^2\,4^2\,3^2\,3^4\,3^4$.
1 of $6^2\,4^4\,3^4\,3^4 = 6^2\,5^2\,3^2\,3^4\,3^4$.
1 of $4^2\,4^4\,4^4\,3^4 = 5^2\,5^2\,4^2\,3^4\,3^4$.
1 of $4^2\,3^2\,3^2\,4^4\,4^4 = 5^2\,3^2\,4^2\,4^4\,3^4$.
1 of $4^2\,3^2\,3^2\,5^4\,4^4 = 5^2\,3^2\,4^2\,4^4\,3^4$.
1 of $4^2\,4^2\,4^2\,3^2\,3^2\,4^4 = 4^2\,4^4\,4^4\,3^4$.
1 of $5^2\,3^2\,4^2\,4^4\,3^4 = 4^2\,3^2\,3^2\,4^4\,4^4$.
1 of $5^2\,3^2\,4^2\,4^4\,3^4 = 4^2\,3^2\,3^2\,5^4\,4^4$.
1 of $4^2\,4^4\,4^4\,3^4 = 4^2\,4^2\,4^2\,3^2\,3^2\,4^4$.

3. *Janal Anaxine Solids.*

1 of $7^2\,4^2\,3^2\,3^2\,3^2\,3^2\,3^2 = 7^2\,4^2\,3^2\,3^2\,3^2\,3^2\,3^2$, autopolar.
1 of do. $= 6^2\,5^2\,3^2\,3^2\,3^2\,3^2\,3^2$.
1 of do. $= 6^2\,4^2\,4^2\,3^2\,3^2\,3^2\,3^2$.
1 of do. $= 5^2\,5^2\,4^2\,3^2\,3^2\,3^2\,3^2$.
2 of do. $= 5^2\,4^2\,4^2\,4^2\,3^2\,3^2\,3^2$.
5 of $6^2\,5^2\,3^2\,3^2\,3^2\,3^2\,3^2 = 6^2\,4^2\,4^2\,3^2\,3^2\,3^2\,3^2$.
5 of do. $= 5^2\,4^2\,4^2\,4^2\,3^2\,3^2\,3^2$.
5 of do. $= 5^2\,5^2\,4^2\,3^2\,3^2\,3^2\,3^2$.
14 of $6^2\,4^2\,4^2\,3^2\,3^2\,3^2\,3^2 = 5^2\,5^2\,4^2\,3^2\,3^2\,3^2\,3^2$.
26 of do. $= 5^2\,4^2\,4^2\,4^2\,3^2\,3^2\,3^2$.
4 of do. $= 4^2\,4^2\,4^2\,4^2\,4^2\,3^2\,3^2$.
18 of do. $= 6^2\,4^2\,4^2\,3^2\,3^2\,3^2\,3^2$, of which one is autopolar.
24 of $5^2\,5^2\,4^2\,3^2\,3^2\,3^2\,3^2 = 5^2\,5^2\,4^2\,3^2\,3^2\,3^2\,3^2$, of which two are autopolars.
43 of $5^2\,5^2\,4^2\,3^2\,3^2\,3^2\,3^2 = 5^2\,4^2\,4^2\,4^2\,3^2\,3^2\,3^2$.
7 of do. $= 4^2\,4^2\,4^2\,4^2\,4^2\,3\,2^3\,3^2$.
10 of $5^2\,4^2\,4^2\,4^2\,3^2\,3^2\,3^2 = 4^2\,4^2\,4^2\,4^2\,4^2\,3^2\,3^2$.
66 of do. $= 5^2\,4^2\,4^2\,4^2\,3^2\,3^2\,3^2$, of which two are autopolars.

If to the above 229 we add the 123 reciprocals of those among them whose list of faces is not that of their summits, *i.e.*, if we exchange faces and summits of the 128, we have the 352 janal anaxines.

4. *Zoneless Triaxines.*

1 of $6^2\,4^4\,3^4\,3^4 = 4^2\,4^4\,4^4\,3^4$.
1 of $6^2\,4^4\,3^4\,3^4 = 4^2\,5^4\,3^4\,3^4$.
1 of $6^2\,4^4\,3^4\,3^4 = 6^2\,4^4\,3^4\,3^4$, autopolar.
1 of $4^2\,5^4\,3^4\,3^4 = 6^2\,4^4\,3^4\,3^4$.
1 of $4^2\,4^4\,4^4\,3^4 = 6^2\,4^4\,3^4\,3^4$.
1 of $4^2\,5^4\,3^4\,3^4 = 4^2\,5^4\,3^4\,3^4$, autopolar.

2 of $4^2\,5^4\,3^4\,3^4 = 4^2\,4^4\,4^4_1 3^4$.

2 of $4^2\,4^4\,4^4\,3^4 = 4^2\,5^4\,3^4\,3^4$.

3 of $4^2\,4^4\,4^4\,3^4 = 4^2\,4^4\,4^4\,3^4$, of which one is autopolar.

The exponents are all multipliers, and give the number of faces or summits which have the same configuration. Thus, the first in Table E is a solid of four different faces, a hexagon, a tetragon, and two triangles, all occurring four times, except the hexagon. It has three summits, a triace, and two tessaraces.

A similar Table E ought to have been added for all the janal 12-edra enumerated in my previous paper above referred to. It may, one day, be an interesting ambition for some student to form, without tentative process, these additional tables. If it should turn out that the primary molecular arrangements of what they call atoms are polyacrons, the study of the symmetry and enumeration of these bodies may come to have some value. Its main charm at present resides in its incredible difficulty.

I shall content myself with constructing the twelve autopolar janal 14-acral 14-edra, of which three are 2-ple monozone monaxines, six are janal anaxines, and three are zoneless triaxines. The three monozone monaxines are:—

$ABCEe_1$, A_1BCE_1e, AA_1ee_1, CDE, CDE_1, ABA_1, EDE_1,
$abceE_1$, a_1bce_1E, aa_1EE_1, cde, cde_1, aba_1, ede_1.

$ABdEE$, ABd_1e_1e, $BdCd_1$, AE_1e, cE_1e, dCE, d_1Ce_1,
$abDee$, abD_1E_1E, $bDcD_1$, ae_1E, CeE_1, Dce, D_1cE_1,

$BDCD_1$, $BAeD$, BAe_1D_1, $Decd_1$, Dd_1E_1C, Aee_1, cee_1,
$bdcd_1$, $baEd$, baE_1d_1 D_1e_1cd, D_1dEC, aEE_1, CEE_1.

E_1e in the first, e_1e in the second, and Dd_1 in the third, are the zoneless polar edges. Each has a zoned 4-gon, and two zoned triangles. The 4-gon AA_1ee_1 has two epizonal edges; $BdCd_1$ and $BDCD_1$ have none, but have each two zoned summits, the triace B and the 4-ace C.

The six autopolar janal anaxines follow :—

ABCDEFG, EDfg, Eba, Eag, Ebc, Fde, CBe,
abcdefg, edFG, eBA, eAG, eBC, fDE, cbE.

ABCDEF, CDGa, ABf, AFbc, GDE, Aef, GEa,
abcdef, cdgA, abF, afBC, gde, aEF, geA.

ABCDE, BCFGa, FDC, FDE, AFE, AFGb, ABg,
abcde, befgA, fdc, fde, afe, afgB, abG.

ABCDE, EDgbc, dGAF, AEF, dEF, ABG, Ecd,
abcde, edGBC, Dgaf, aef, Def, abg, eCD.

DEFcb, ABCD, BGFd, AGFE, AGB, CDf, DEA,
defCB, abcd, bgfD, agfe, agb, cdF, dea.

ABCDE, ABed, Agcb, Adfg, CDF, AEb, GFC,
abcde, abED, aGCB, aDFG, cdf, aeB, gfc.

The three autopolar zoneless triaxines are the following:—
ABCa, Acba, ABD, A_1B_1D, A_1DBc_1, ADB_1c, BCb_1c_1,
$A_1B_1C_1a_1$, $A_1c_1b_1a_1$, abd, a_1b_1d, a_1dbC_1, adb_1C, bcB_1C_1.
The three zoneless poles are the 4-ace D, the 4-gon BCb_1c_1, and the edge Aa.

ABCDA_1, $A_1B_1C_1D_1A$, Ab_1a_1B, A_1Dc, a_1DC, A_1cb, aC_1B_1,
abcDa_1, $a_1b_1c_1D_1a$, aB_1A_1b, AD_1c_1, aD_1C_1, Ac_1b_1, a_1CB.
The zoneless poles are the 4-ace D, the 4-gon $Ab_1a_1B_1$, and the edge AA_1.

Adcad$_1C_1$, ABCA_1, $A_1B_1C_1A$, ABd, A_1B_1D, Bdc, $B_1d_1C_1$,
$A_1Dc_1a_1D_1C$, $aB_1c_1a_1$, a_1Bca, aB_1d_1, a_1BD_1, B_1Dc_1, BD_1C.
The zoneless poles are the hexace B, the hexagon Adcad$_1C_1$, and the edge AA_1.

As the zoneless triaxines have no janal features besides their three poles, they do not read so symmetrically as the preceding figures. All these constructions would be, perhaps, more intelligible if to every summit were appended a sinister suffix denoting its rank, as 6 to the hexace B, 4 to the 4-ace A, &c. Any student who may take a fancy to the subject can do that for himself.

How many autopolars there are among the scores of thousands of non-janal 14-acral 14-edra, I have not examined. This may be one of the amusements of my old age.

Let me correct two oversights in my Paper in the preceding volume. At page 257, line 13, for *monozone* read *homozone*, as it rightly stands on page 260. In line 14, for *one* read *three*; for the following Table B contains 18 janal 2-ple zoneless poles, of which six are in the six 2-ple monaxine monozones, two in the homozones (1 and 5), and one in the 2-ple janal monaxine (7). The remaining nine must be found in three zoneless triaxines: and by this rule these solids are always enumerated.

VEGETATION AND CLIMATE.

By RICHMOND LEIGH, M.R.C.S.E.

Geographical Botany was raised to the position of a special and important science by Humboldt. He laid the foundation upon which De Candolle, Schouw, Meyen, and others have built up the noble but unfinished structure of the present time. Meyen, more particularly, shewed that, as certain regions contained certain plants, these plants indicated the region in which they were found as regards its climate. This character of the vegetation of any climate is in all cases sufficiently well marked to shew plainly the climate of that region, and is a more certain guide than any other save that of registered facts, which it nearly equals. From our want of knowledge of the range of many plants, our deductions are necessarily very imperfect, but still most valuable. As our botanical knowledge increases, our climatological information will also grow, until, sooner or later, we shall be able to indicate the climate of any region from the examination of its flora, almost perfectly.

In most countries vegetation is met with under two conditions, natural, or in a state of nature, and cultivated. The former, being exposed to all natural influences, is the most valuable guide to the character of any regional climate, and should be chiefly relied upon in any such research. Cultivated vegetation is also of great value for this purpose, but this value varies according to the more or less artificial conditions of culture. A plant grown from seed sown by man, and otherwise untended, is equivalent, for climatic purposes, to one produced in a state of nature; but if the

plant be protected from cold, and watered in dry weather, it will give little indication of the climate of its habitat. The deserts of tropical and sub-tropical regions would be covered with luxuriant vegetation, were they supplied with abundant moisture, as seen in Egypt, where the overflow of the Nile is the determinant of the harvest. Therefore, in estimating the value of plants under cultivation, it is necessary to know the conditions of cultivation, so that, these being known, we may then be able to use the plants as climate indicators. It has been considered by some that plants under care and cultivation may be altered in habit, and made able to bear greater extremes of temperature and moisture than in a state of nature. This is true in but a limited degree, and it may be considered as an axiom, that plants are not capable of true acclimatisation. Our fruit trees, and other plants too numerous to mention, are as sensitive to frost now as they were in all probability a thousand years ago; and the instances in which imported plants are said to have been hardened and acclimatised will, on close examination, generally be found incorrect. Our worthy President has given us his experience in growing the Eucalyptus, which every care fails to make endure our climate. Taking into consideration, then, the conditions under which cultivated plants are grown, the knowledge obtained may be utilised in estimating any given climate.

There is of necessity, even with every favouring circumstance, always a limit (at least towards the poles) to the flourishing growth of plants, though their natural area may be greatly extended by cultivation.

Temperature—of the factors which go to form "climate,' is by far the most important, and has much more influence on vegetation than any other. A constant, though irregular, development in plant growth is found as we proceed from the

poles to the equator. The effect of heat is so notable, that Dr. Carpenter considers it to be *the* vital force, and though this may be considered doubtful or improbable, it is none the less certain that heat is an essential condition of the working of that mysterious agency—life.

The development of plants with increasing temperature is shewn by their greater size, both as a whole and in their individual parts, by their greater numerical ratio, both as regards species and individuals, and by their increased beauty or strangeness of form and colour, as well as by their more vigorous growth. This development is especially shown in the *Endogenous* division of plants, none of which assume the arborescent form till we come to the warmer temperate zone, where a small palm, the *Chamærops humilis*, is met with. Endogenous trees or shrubs are not met with in numbers till we reach the tropics, where palms, screw pines, bananas, bamboos, and other members of this plant section form an important feature in the physiognomy of the vegetation. The development in size produced by increased temperature is well shown in the order *Gramineæ*, the representatives of our humble grasses, rising in the tropics to the height of fifty, sixty, and even one hundred feet (Gardner), thus surpassing our forest trees in height. The lilies of our climate are represented by the aloes and dragon trees of hot regions, and numberless similar examples may be cited.

Acrogens are also only found arborescent in warm climates, where the graceful tree ferns attain to fifty or sixty feet in height.

Exogens, though not exhibiting so marked an increase in size with increased temperature as a whole, still present in many individual instances very great advancement in this respect, as in the mallows and their allies, which may be considered to be represented by the enormous Baobab trees of Africa.

The *individual parts* of plants also show this *increased* development. The largest leaf expansion, as seen in the banana, is only found in the moist torrid zone. The Rafflesia of Java bears flowers often eight or nine feet in circumference, and fourteen pounds in weight, and an Aristolochia, on the river Magdalena of South America, has flowers four feet in circumference, which are used occasionally by the natives as hats.

Nearly all orders of plants *increase in numerical ratio* towards the equator, there being but few exceptions, and these generally lowly in form, as the *Juncaceæ*, or rush tribe. Meyen remarks, that "the lower the plant form, the wider the range"—a correct general axiom. The reverse may be stated, that "the higher and more developed the plant, the more limited its range." Many orders are limited to the torrid zone, and a considerable number are bounded by the tropics. The number of plants increasing individually as well as collectively, there is necessarily more variety towards the equator; a fact prominently shewn in the forests, which are much more diversified in character, and have not the social aspect of those of colder regions.

The *coloration* of plants depending on the light of the sun, it were to be expected that we should find the most vivid hues beneath a tropic sky, this vividness of coloration extending to the green parts of plants, which are of a much brighter and fresher hue. The various parts of plants also present more strangeness of form towards the equator, as when the Orchids mimic the forms of insect life so exactly as often to deceive the human eye.

Increase of temperature also shews remarkable results in the *increased vigour* of plants, which, in the torrid zone, grow with a rapidity unknown in colder regions. This may be considered to account in great measure for the strange

productions of the tropics; for, given the special impetus to one portion of a plant or flower, the rapidity of growth of that part produces the strange and unsymmetrical appearance of the flower or plant in question.

While the mean temperature constantly rises proceeding from the poles to the equator, its *range* diminishes till it reaches its minimum at the equator, where the seasons of the year are little marked, at least as regards the temperature. In this latter region the seasons are chiefly known according to the rainfall, as the "dry" or "wet" season, and not, as with us, by spring, summer, &c.

This range of temperature has a most important influence on vegetation; which latter, carefully studied, gives us the extent of the former very precisely, more particularly with regard to its lowness. Naples and New York are nearly in the same latitude; but while in the former orange trees flourish in the open air, in the latter they cannot even exist, and do not grow for some distance further south. Yet the summer of New York is as hot as that of Naples. Hence the conclusion comes naturally, that it must be owing to the severe winter. Other circumstances may combine to produce this effect, but this is certainly the chief.

But while the lower limit of temperature has a most marked influence on vegetation, the higher one has but little comparatively, few plants being limited towards the equator. Most plants have a tolerably well-defined limit towards the poles, but appear able to endure almost any amount of heat. Corn is cultivated from 70° north latitude to the equator. But, though the limit is ill-defined simply with regard to height of temperature, it is generally sufficiently marked, owing to the more luxuriant growth of other vegetation. The cold limit of plants is practically sufficient to indicate the regional climate, as there are plants limited to the

hottest—to even a few degrees each side of the equator—and every succeeding zone of the earth; so that each region is indicated by either positive or negative evidence—by the presence or absence of plants.

It is by the combination of this positive and negative evidence that we can best estimate the regional climate; and not by the positive alone, which method has hitherto, as far as I know, only been pursued.

The third climate factor, the second in importance, is *moisture*. An abundant supply of water is especially necessary to vegetation in climates of high temperature, where the great evaporation needs a proportionate supply.

A high temperature and a deficient supply of moisture is sure to be associated with sterility. And, as with temperature, so with regard to moisture, the range is of great importance, and those climates which have an abundant and equable distribution of water, in whatever way, are characterised by the most luxuriant vegetation; while those that suffer from prolonged droughts have their flora proportionately affected. The latter condition produces a perfectly characteristic vegetation, shown notably in the *Cactaceæ*, *Aloes*, &c., and, to a less degree, in the heaths and rigid-leaved trees of Australia.

Luxuriant mixed forests always indicate an abundant supply of water. Darwin says, "In South America the limit of the forest land follows in a remarkable manner that of the damp winds. On the west, where the gales charged with moisture from the Pacific prevail, every island on the broken coast, from lat. 38° S. to the extreme of Terra del Fuego, is densely covered by impenetrable forests, &c." And this is still more marked as we approach the equator. There are open forests in dry regions, as in Australia, but these do not present the luxuriant and mixed character of the true forests, and are composed chiefly of rigid-leaved *Proteaceæ*, *Acaciæ*, *Eucalypti*, and other plants, the whole having a dull appear-

ance, and lacking the freshness and variety of the true typical forest. The Caatinga of Brazil presents a similar example of open forest, the result of a limited supply of moisture, and exhibits, as an effect of this, the phenomenon—singular to us—of shedding its leaves in summer, the dry season, and being verdant in winter only.

Deficient moisture produces the same retardation of growth that low temperature does, though in a less degree. Livingstone remarks, that, "in the well watered country, plants which in the dry regions of the south (with a nearly equal temperature) are mere shrubs, become great trees."

These four factors, temperature and moisture, and their respective ranges, are the chief determinants of climate with regard to vegetation. A further point of importance may be added; viz., the relation which the ranges bear to each other, as it will be of great importance whether the highest temperature and the greatest humidity occur together or at opposite seasons.

Having considered the general influence of climate, through its chief factors, on vegetation, we may now proceed further, and consider its special influence on particular regions. This influence is shown by the limitation of species, though this limitation is not necessarily climatic. Physical configuration and soil are most potent, often insurmountable, barriers to the spread of plants. The Atlantic Ocean effectually stops the spread of most plants on either shore to its opposing one; and in the few cases in which plants have floated to great distances, they must of necessity be very indestructible, and can only proceed in one direction. But leaving out these two agents, climate is the only other consideration of importance as affecting vegetation. From the physical configuration of the globe preventing the continuous spread of plants, and limiting species, often most effectually, any zone or belt of equal mean temperature may

present very different flora in different parts, when those parts are separated by natural barriers, *e. g.*, South Africa and South America. But there is, notwithstanding, a similarity or analogy, at once apparent to the eye of the naturalist, and also, in nearly all cases, corresponding plants are found in greater or less numbers.

In studying the climatic character of any flora, three methods may be pursued:—

1. The whole flora of the region may be considered and analysed;
2. Certain combinations of orders, genera, or species of plants, "climatic plant groups," may be taken as representative of the climate; and
3. The presence of certain typical plants may be looked for.

Of these three methods, the first is of necessity the most perfect, but at the same time the most laborious, a great portion of the labour incurred being useless, from the wide diffusion of many plants. The second approaches the first in correctness of information, and is, comparatively, of easy application. The third is the simplest and least perfect, yet gives much information with little trouble.

The second method, that of climatic "plant groups," may be assumed to be the method the most useful for all ordinary purposes, but to it may be added the third, from its simplicity, and the slight additional labour entailed. It is, of course, on the correct formation of these plant groups that the exactness of our knowledge depends. These plant groups, *in their entirety*, are to be found almost throughout their respective regions or zones; and in most of the limited portions where they are not found as a whole, some members of the group are present. With regard to the old world, and especially its northern portion, they are all but universal; and in the new world, and in the southern parts of the old, they

are very generally met with. There is considerable variation from the standard in South America, and still more in Australia. In cases like these, plants under cultivation, being diffused almost coextensively with the human race, are of great assistance in determining climate. Certain plants, as remarked before, may be considered typical of the region in which they occur. To be so considered, the "type plant," or *climatic phytotype*, should either be absolutely limited to the region, or especially prominent in its region, though occasionally to be found elsewhere. The more limited in extent it is, the more valuable will it be as a climate indicator, its value in this respect reaching its acmè when it is actually limited to a single region. An absolute phytotype like this is comparatively rare, save in the tropical region, where all the phytotypes given in the diagram are absolute, or solely confined to that region.

Many plants have narrower limits than even this. The *Copernicia cerifera* does not extend beyond 12° south latitude, and already, according to Liais, even there its vegetation is decidedly poorer than nearer the equator. According to the same author, the limit quoted is that of many other species. He also gives 18° south latitude as the limit of the Mauritius palm, and makes the more surprising statement that many species of plants are limited between 12° and 18° south latitude.

From what has been already stated as to the much clearer definition of the polar as compared with the equatorial limit of plants, it would follow that absolute phytotypes would more likely appear near the equator than elsewhere. No doubt there are phytotypes absolutely confined to other regions, but they have not attracted the attention of botanists, who are generally content with enumerating the species of plants, without entering on the more laborious task of defining their area or range.

The regional divisions of the earth's climate adopted in the present Paper are, I think, in the existing state of knowledge, the most practically useful. They possess the great defect of being artificial, instead of natural. This artificiality is not so great as, at first sight, would appear, for, although arbitrary degrees of latitude have been fixed of necessity as bounding the regions, the central, or *median flora*, is the only one taken into consideration, and is of sufficiently naturally distinctive character to mark its special region. This median or central flora, as represented by the climatic plant group, is only found in its typical perfection in the *centre* of the region it characterises. Towards either margin it gradually loses its prominent character, till it merges into that of the proximate region, and it is only by comparing floras of more or less distant regions that a distinct advance is shown. It would be more correct to call it the *flora or climatic plant group of a certain mean temperature*—that of the region it is found in—in which case, "the more perfect the group, the nearer the mean temperature of that group" might be assumed as the general law.

Following Meyen, I have adopted lines of latitude as regional divisions, on account of their greater convenience. It would appear more correct to adopt isothermal lines (or still more, isochimenal), but as the various regions have no distinct border, being shaded off gradually, no line of demarcation can be absolutely fixed. The lines of latitude include nearly the whole of the regions indicated, *i. e.*, in their typical aspect, and are used conventionally as the simplest division, and as being more generally applicable and understood. To merit separation into a primary region, the flora must be decidedly distinctive and characteristic of that region alone, whatever may be the minor distinctions of secondary and tertiary divisions.

The climate of the earth is usually divided primarily into into three zones—the Torrid, Temperate, and Frigid. The

torrid may be considered to extend to the 34th parallel of north and south latitudes. Very many plants, and many orders of plants, are limited to this zone. It may be characterised as the zone of palms and bananas, and, in its dry regions, of cacti. The *temperate* may be bounded by the 34th and 58th parallels, and is marked by social forests of both deciduous and evergreen dicotyledons. The *frigid* zone extends from the 58th parallel to the poles, and is characterised by abietinæ and stunted vegetation.

These primary zones have been variously subdivided. Meyen's division, to which I shall again refer, is the most practical and generally adopted. He divides the torrid zone into equatorial and tropical, the temperate into sub-tropical, warm and cold temperate, and the frigid into sub-arctic, arctic and polar. But the differences between certain of these are not greatly marked, and are hardly sufficient to warrant their separation as primary zones.

The equatorial and tropical zones differ, as regards climate, chiefly in the *range* of temperature, the former being the more equable, while the latter, though more distant from the equator, has the greater range both in height and lowness, but the *mean* temperature of both is nearly the same. On this account I have considered them as a single primary region. The arctic and polar regions differ only moderately with regard to their flora, and that in degree, and not so much in nature.

Considering these points, a new subdivision may be made, as follows :—

The torrid zone, into tropical and sub-tropical regions, appropriating the latter from Meyen's temperate group ;

The temperate, into warm and cold ; and

The frigid, into arctic and sub-arctic.

In the torrid zone a very limited amount of moisture pro-

duces such characteristic effect on the flora, that I have added a seventh region, of irregular formation—the dry torrid. In colder latitudes the effect of limited moisture produces much less special effect on the vegetation. It will be seen that, omitting the first and last regions, the mean temperature of each rises nine degrees Fahrenheit, or five degrees centigrade, proceeding from the direction of the poles to the equator.

These primary regions or zones may now be separately considered, commencing with the lowest type of vegetation, as found in the coldest zones.

The *arctic* and *antarctic* regions extend from the poles to the arctic and antarctic circles, in latitudes 66° 32′, and include the polar and arctic zones of Meyen. The temperature for much the greater part of the year is below the freezing point of water. The season during which it rises above that point is very short near the poles, summer in that region lasting only for about six weeks, but during that period the sun is above the horizon uninterruptedly. Vegetation is therefore very limited. Below 70° latitude, trees are found, and occasionally as near the pole as 71° or 72°.

The first in appearance is the birch, then some firs—*Pinus Sylvestris* and *Abies excelsa*. The only other trees found in this region are the aspen and mountain ash. Hence the characteristic of this region is the undeveloped and stunted character of its flora, which is very similar to that of the "alpine" region of botanists. The positive plant group of this region includes saxifrages, lichens, rushes and carices. The undeveloped state of vegetation here is well represented by the herbaceous willow (*Salix herbacea*), which grows from six to seven inches high, and may be taken as a climatic phytotype. An entire absence of trees and of cultivated plants characterises the greatest part of this region.

The *sub-arctic or sub-temperate* region has the same extent as Meyen's sub-arctic zone, *i. e.*, from about latitude 66° to 58°. There is a great increase in the mean temperature of this compared with the last region, and the summer is considerably longer; hence a corresponding improvement is seen in the vegetation. Most prominent in this region are social forests of the *Abietinæ*, or fir trees, varieties of pinus, and abies. Species of poplar and birch are also numerous in this region. The birch and Scotch fir (*Pinus Sylvestris*) are typical of this region, as also some other firs, especially *Abies excelsa*, the spruce fir, &c. Willows are numerous. Negative evidence of this region is found in the general comparative absence of deciduous dicotyledonous trees, as the beech, sycamore, oak, &c., and also of cultivated wheat, and certain fruit trees, as the apple, pear, cherry, &c.

The *cold temperate* region lies between the 58th and 45th degrees of latitude, and includes our own country. Its average mean temperature is 50° Fahrenheit, or 10° centigrade. This region is characterised by the large number of deciduous dicotyledonous trees. Among these may be mentioned the oak, beech, elm, sycamore, willow, and alder. Conifers, especially species of pinus, are very numerous in this region, as in the last, but do not form nearly so large a proportion of the forests.

Among cultivated plants, the apple, pear, cherry, and many rosaceous plants are notable. The negative flora of this region include the orange, olive, aloe, cactus (*opuntia*), and, generally speaking, the evergreen exogens.

The *warm temperate* region extends from lat. 45° to 34°. The mean average temperature is 59° Fahrenheit. The winter season is much less marked than in the regions previously considered, frost being rare in a great part of this region.

A corresponding effect is produced on vegetation, the leaf not falling in by far the greater number of trees. Hence evergreen trees abound, and especially of the dicotyledonous section of plants which, in our climate, are notable for their deciduous nature. The evergreen oaks, the plane, chestnut, olive, and laurel abound. The orange, lemon, and vine grow luxuriantly, and the tea and cotton plants find their habitat here.

The immense *Wellingtonias* of California, the *Araucarias* of the Southern Hemisphere, the *Eucalypti*, so much overlauded as marsh driers, also mark this region. Phytotypes are the olive, orange, evergreen, and cork oak. Musaceæ—the banana family—are conspicuous by their absence. A few palms are found, especially on the equatorial border, but generally speaking they are absent.

The *sub-tropical* region extends from the 34th parallel of latitude to the tropics. Its mean temperature is 68° Fahrenheit, and frost is unknown in it. The summer temperature is as high as—often higher than—that of the tropical region, while the winter temperature is much lower. Hence plants requiring a constant high temperature fail here, while those requiring merely a hot summer flourish.

Notwithstanding this, there is a great similarity between the flora of this region and that of the tropics, and the difference lies chiefly in the comparative number of species, and not in their variation. Palms, bananas, figs, and other plants which attain their numerical maximum in the tropics, are frequently met with here, and only the comparatively small number of delicate plants are absent from this region. During the moderation of temperature in the winter season, many plants found in more temperate regions flourish, while in summer they give way to the heat or the greater luxuriance of other plants.

From what has been remarked it will be seen that the

flora of this region is more mixed and transitional than characteristic. It presents a combination of temperate plants, as myrtles, laurels, camellias, and fuchsias, with true tropical forms, as palms and bananas. Prominent among its flora are also magnolias, zamias, acacias, mimosas, and heaths.

Rice, cotton, coffee, and maize are cultivated in this region. Pepper and the nutmeg fail to succeed.

The *tropical* region proper — that lying within the tropics—shews us vegetation in its most advanced condition. In this region I have included Meyen's equatorial and tropical zones, the vegetation of which is hardly sufficiently distinct to warrant separation. The mean temperature of the region is 77° Fahr., or 25° centigrade. As Humboldt remarks, the vegetation of this district is characterised by a disposition to become arborescent; forms which in a higher latitude scarcely rise above the ground, in this region form shrubs or trees, as, *e.g.*, the grasses, ferns, and even mosses.

The flora of this region is further characterised by a great variety of forms, most notable among which are the Palms, which may be considered the noblest forms of vegetation, and which are the admiration of every traveller in this region. Their simple, yet noble and graceful form, which is only imitated in a much minor degree by the tree-fern, brings them prominently out in the tropical flora.

The *Musaceæ* —plantains and bananas, with their enormous leaves — are also a notable plant-form in this region. Other prominent types are the arborescent grasses; the Epiphytic Orchids, many of which only find sufficient moisture and heat in the damp, tropical forest; the Pandani, or screw-pines; Scitamineæ, Tree-Ferns, and the great climbers known as Llianas. These last extend from one tree to another, often for hundreds of feet, like great ropes binding the various plants together, and forming a special feature in tropical forest vegetation. Ferns, in their various forms of

ground, tree, and climbing ferns, abound in the moist atmosphere of this district, in many parts of which it rains daily. In those places where unusually great moisture obtains, especially in some islands, as Otaheite, ferns form a fourth of the vegetation.

Many plants, and some orders—as the Marantaceæ, or arrow-root family—are only found in this region. Among species exclusively confined to this region—or absolute phytotypes—may be mentioned the Mauritius and Areca palms, and the Copernicia Cerifera.

While some few orders of plants are confined entirely to this region, a very much larger number are nearly, though not quite, so restricted. The Piperaceæ, Scitamineæ, and many others are examples of this; so that this region, of necessity, possesses a much richer vegetation than any other region, as but few of the flora of other regions fail to be found here also, and nearly all orders of plants reach here their highest numerical ratio.

From the eternal summer which reigns in this region, and more particularly in the part nearer the equator, vegetation presents little change according to season, or rather time of year, and that little merely follows the distribution of moisture, so that in some parts, where the rain is deficient at one part of the year—generally the summer period—there is a slight imitation of the fall of the leaf of our climate. But this is exceptional, and, speaking generally, vegetation presents a continuous brilliant glory and grandeur, which harmonises well with the hues of the animals that inhabit these regions. Nature, here, is also most prodigal in her fertility; the banana, under tropical weather, yields somewhat like fifty times that of wheat in our climate.

But let the moisture of this region fail, and we have the *dry torrid* region, the vegetation and climate of which

DIA

FRIGID.

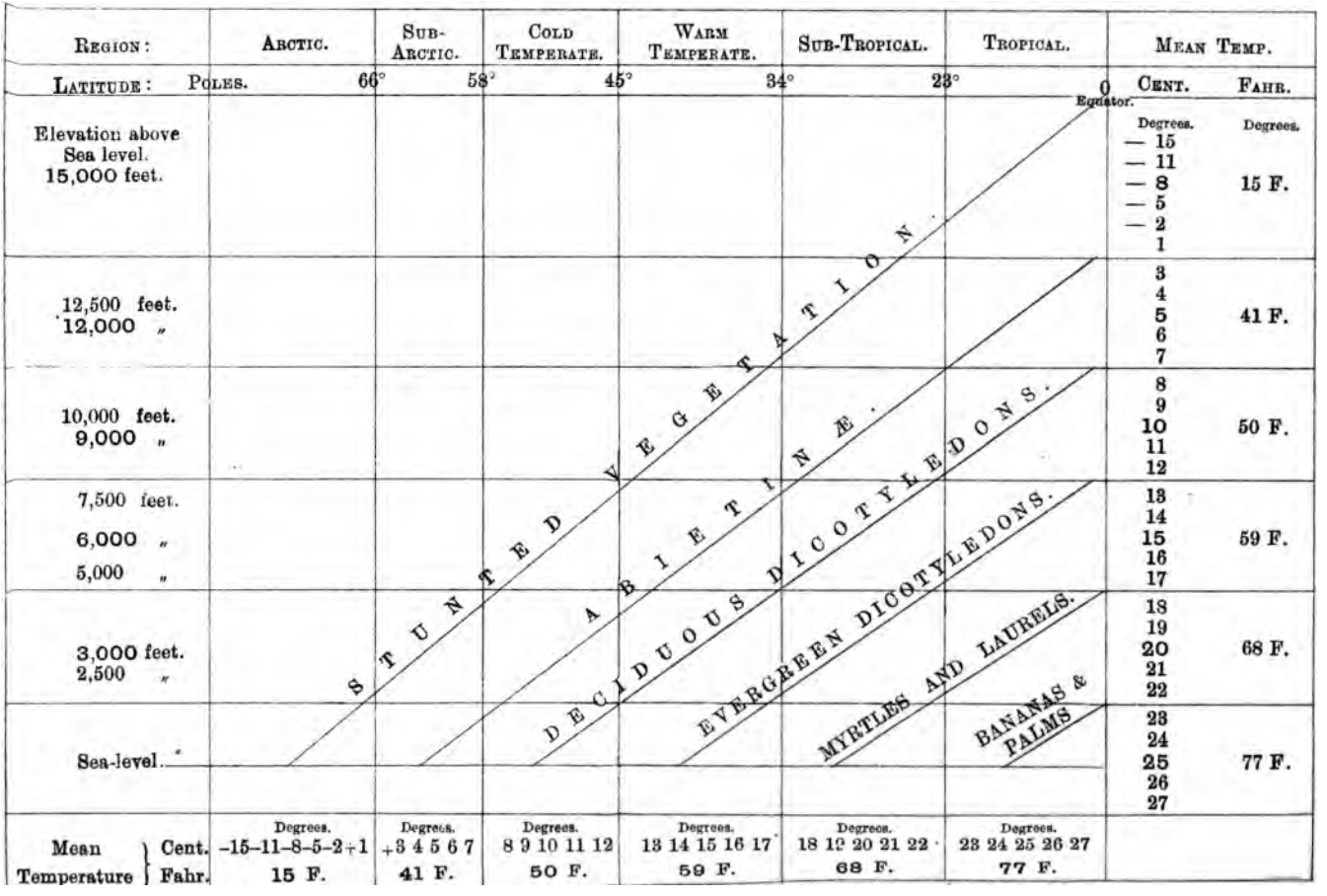
REGION		Arctic	Sub-Arctic.	Cold Tem
EXTENT FROM (LAT.)		Poles to 66° 32′.	66° to 58°.	58° to
MEAN TEMP.		15° Fahr.; −8° Cent.	41° F.; 5° C.	50° F.; 1
CLIMATIC PHYTOTYPE ...		Salix Herbacea. Stunted Birch.	Birch. Pinus Sylvestris.	Beec Oak Appl
CLIMATIC PLANT GROUPS	POSITIVE	Saxifrages. Lichens. Carices. Stunted Vegetation.	Abietinæ. Willows.	Decidu Dicotyle Abieti Willo
	NEGATIVE	Trees.	Deciduous. Dicotyledons.	Myrtac
CULTIVATED PLANTS	POSITIVE		Barley. Rye.	Whea Appl Pea
	NEGATIVE		Wheat.	

MEYEN'S	ZONES.....	Polar.	Arctic.	Sub-Arctic.	Cold Tem
	PLANT GROUP.	Alpine Flora.	Rhododendra, &c.	Abietinæ.	Decidu Dicotyle

A.

.TE.		TORRID.	
ıRM TEMPERATE.	SUB-TROPICAL.	TROPICAL.	DRY TORRID.
45° to 34°.	34° to 23°.	23° to 0°.	40° to 0°.
9° F.; 15° C.	68° F.; 20° C.	77° F.; 25° C.	68° to 83° F.; 23° to 27° C.
Vine. Olive. Orange. ımærops Humilis.	Date Palm.	Marantaceæ. Mauritius Palm. Copernicia Cerifera.	Doom Palm. Tamarisk. Spinifex.
Evergreen Dicotyledons. Myrtles. Laurels.	Myrtles. Laurels. Bananas.	Palms. Bananas. Piperaceæ. Screw Pines. Orchids.	Cacti. Aloes. Mesembryanths. Euphorbias.
Musaceæ.	Piperaceæ.		Ferns. Epiphytes.
Pine. Maize.	Sugar Cane. Tea.Date. Coffee.	Pepper. Manioc. Bread Fruit.	Date.
Sugar Cane. Coffee. Banana.	Pepper.		

RM TEMPERATE.	SUB-TROPICAL.	TROPICAL.	EQUATORIAL.
Evergreens.	Myrtles.	Tree Ferns.	Palms.
Dicotyledons.	Laurels.	Figs.	Bananas.


Region:
Arctic.
Sub-Arctic.
Cold Temperate.
Warm Temperate.
Sub-Tropical.
Tropical.
Mean Temp.
Latitude:
Poles.
66°
58°
45°
34°
23°
0
Equator.
Cent.
Fahr.
Elevation above Sea level.
15,000 feet.
12,500 feet.
12,000 "
10,000 feet.
9,000 "
7,500 feet.
6,000 "
5,000 "
3,000 feet.
2,500 "
Sea-level.
Degrees.
— 15
— 11
— 8
— 5
— 2
1
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
Degrees.
15 F.
41 F.
50 F.
59 F.
68 F.
77 F.
STUNTED VEGETATION.
ABIETINÆ.
DECIDUOUS DICOTYLEDONS.
EVERGREEN DICOTYLEDONS.
MYRTLES AND LAURELS.
BANANAS & PALMS
Mean Temperature
Cent.
Fahr.
Degrees.
-15-11-8-5-2+1
15 F.
+3 4 5 6 7
41 F.
8 9 10 11 12
50 F.
13 14 15 16 17
59 F.
18 19 20 21 22
68 F.
23 24 25 26 27
77 F.

appears so special, that I have separated it from the other regions in whose latitudes it lies. It extends to about 40° on either side of the equator. I have given it this limit, as, beyond this,—though there may be dry and more or less of barren extent of land,—the vegetation loses the distinctive character, which is due to the high temperature, combined with its dryness, and not to the infertility of the soil, as in some colder regions. The limitation of moisture — for it is never, not even in the desert of the Sahara, totally absent— produces great effects on vegetation, effects that may be separated into two divisions: in the first and more limited effect, from the greater supply of moisture, the leaf, the chief part affected, of the plant becomes hard and rigid; this characteristic is well seen in some of the plants of Australia, as the proteas, banksias, casuarinas, and leafless (?) acacias of that country. The second and true characteristic effect is the thickening of the leaf, so as to produce a fleshy organ, filled with a juicy, succulent parenchyma. This is seen typically in the cacti, aloes, &c. A more striking result is, when plants, not so naturally, become fleshy in these dry regions, *e. g.*, stapelia and ceropegia among the *Asclepiadaceæ*, and cacalia among the *Compositæ*. Two palms, the date and the doom, are frequently found in this region. Furcreæ and many zygophyllaceæ, mesembryanths, euphorbiæ and epacridaceæ, characterise this region also.

The only plant that can be considered at all cultivated is the date palm, which, however, is almost in a state of nature. This is leaving out of the question the regions irrigated by the Nile, &c., which, though naturally in this region, by irrigation are removed from it.

A few remarks explanatory of Diagram B may be of service, especially with regard to mean temperature and the

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ground, tree, and climbing ferns, abound in the moist atmosphere of this district, in many parts of which it rains daily. In those places where unusually great moisture obtains, especially in some islands, as Otaheite, ferns form a fourth of the vegetation.

Many plants, and some orders—as the Marantaceæ, or arrow-root family—are only found in this region. Among species exclusively confined to this region—or absolute phytotypes—may be mentioned the Mauritius and Areca palms, and the Copernicia Cerifera.

While some few orders of plants are confined entirely to this region, a very much larger number are nearly, though not quite, so restricted. The Piperaceæ, Scitamineæ, and many others are examples of this; so that this region, of necessity, possesses a much richer vegetation than any other region, as but few of the flora of other regions fail to be found here also, and nearly all orders of plants reach here their highest numerical ratio.

From the eternal summer which reigns in this region, and more particularly in the part nearer the equator, vegetation presents little change according to season, or rather time of year, and that little merely follows the distribution of moisture, so that in some parts, where the rain is deficient at one part of the year—generally the summer period—there is a slight imitation of the fall of the leaf of our climate. But this is exceptional, and, speaking generally, vegetation presents a continuous brilliant glory and grandeur, which harmonises well with the hues of the animals that inhabit these regions. Nature, here, is also most prodigal in her fertility; the banana, under tropical weather, yields somewhat like fifty times that of wheat in our climate.

But let the moisture of this region fail, and we have the *dry torrid* region, the vegetation and climate of which